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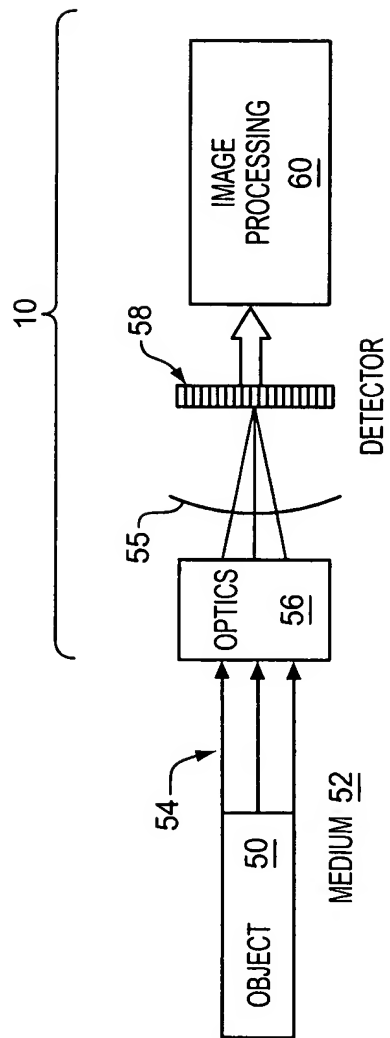
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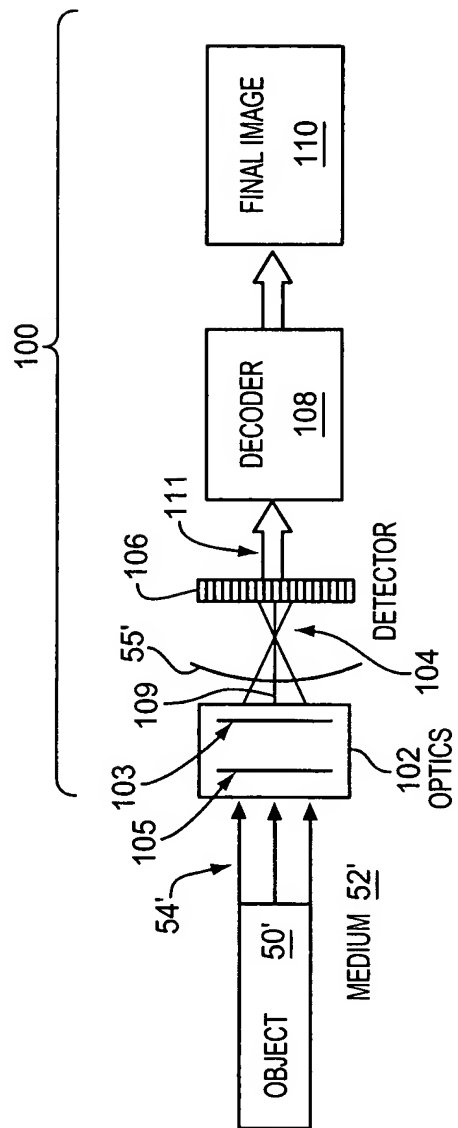
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**FIG. 1**  
**PRIOR ART**



**FIG. 2**

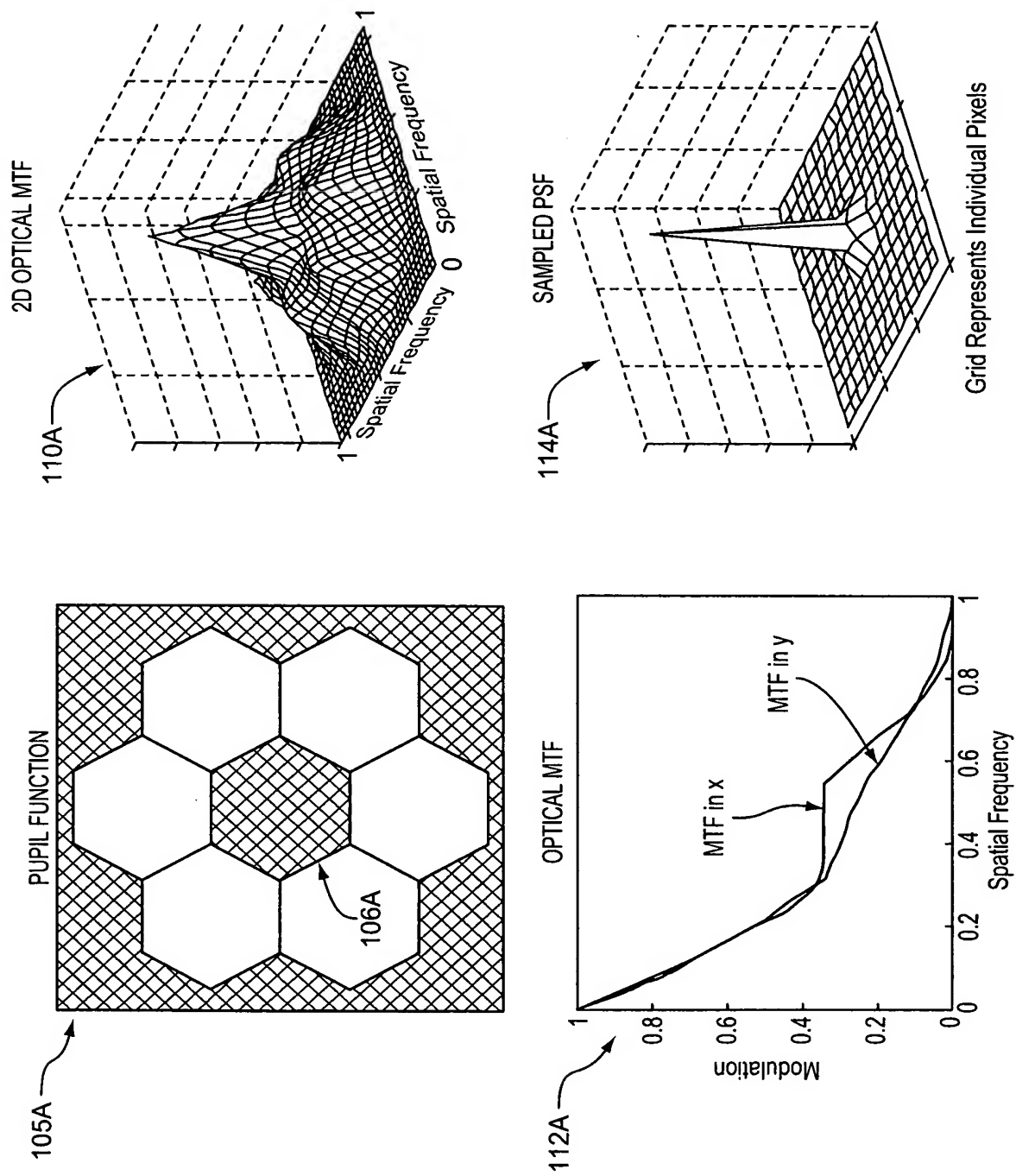
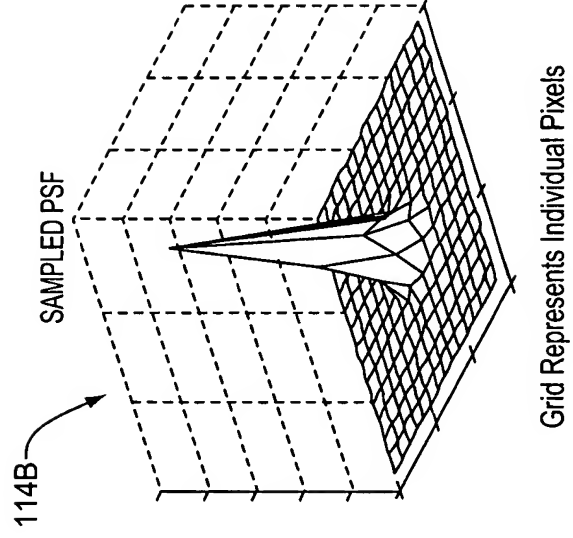
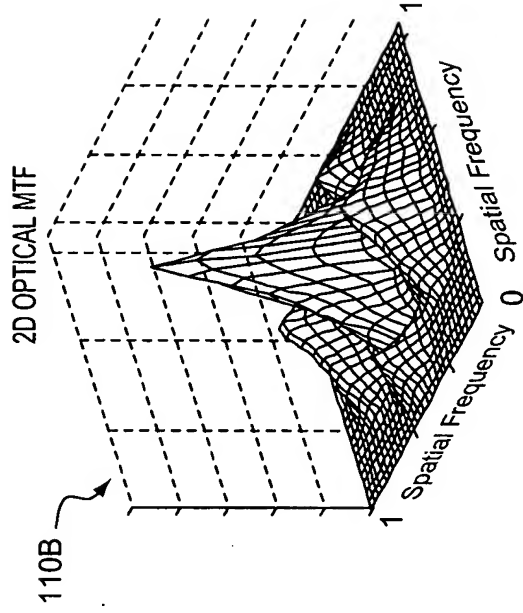
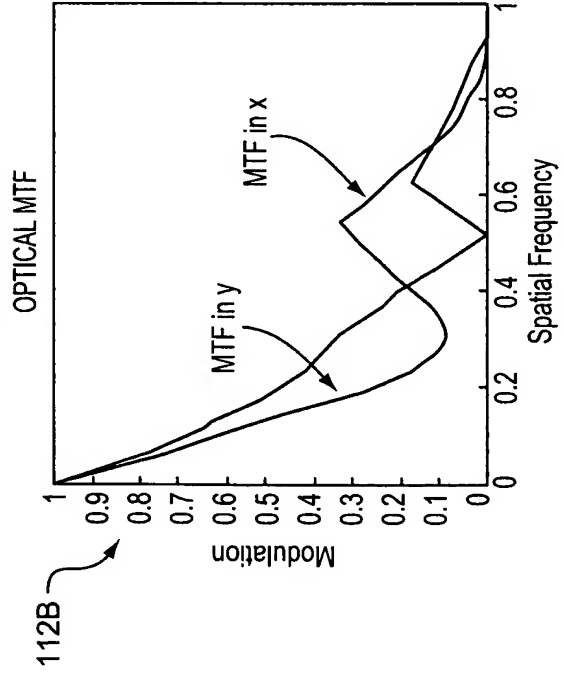
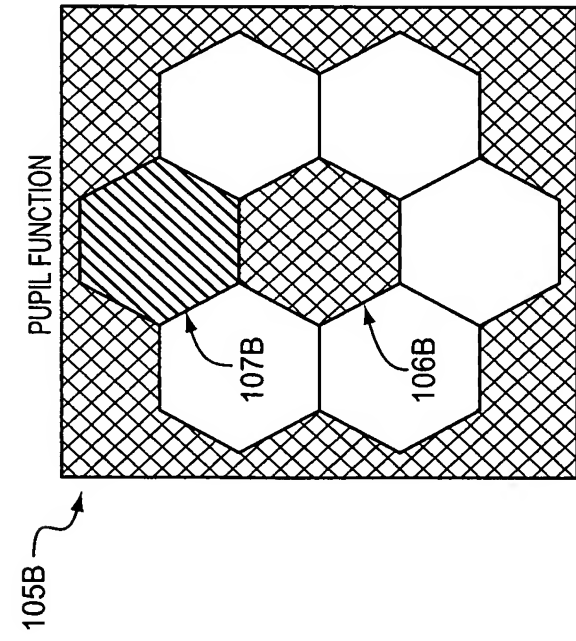
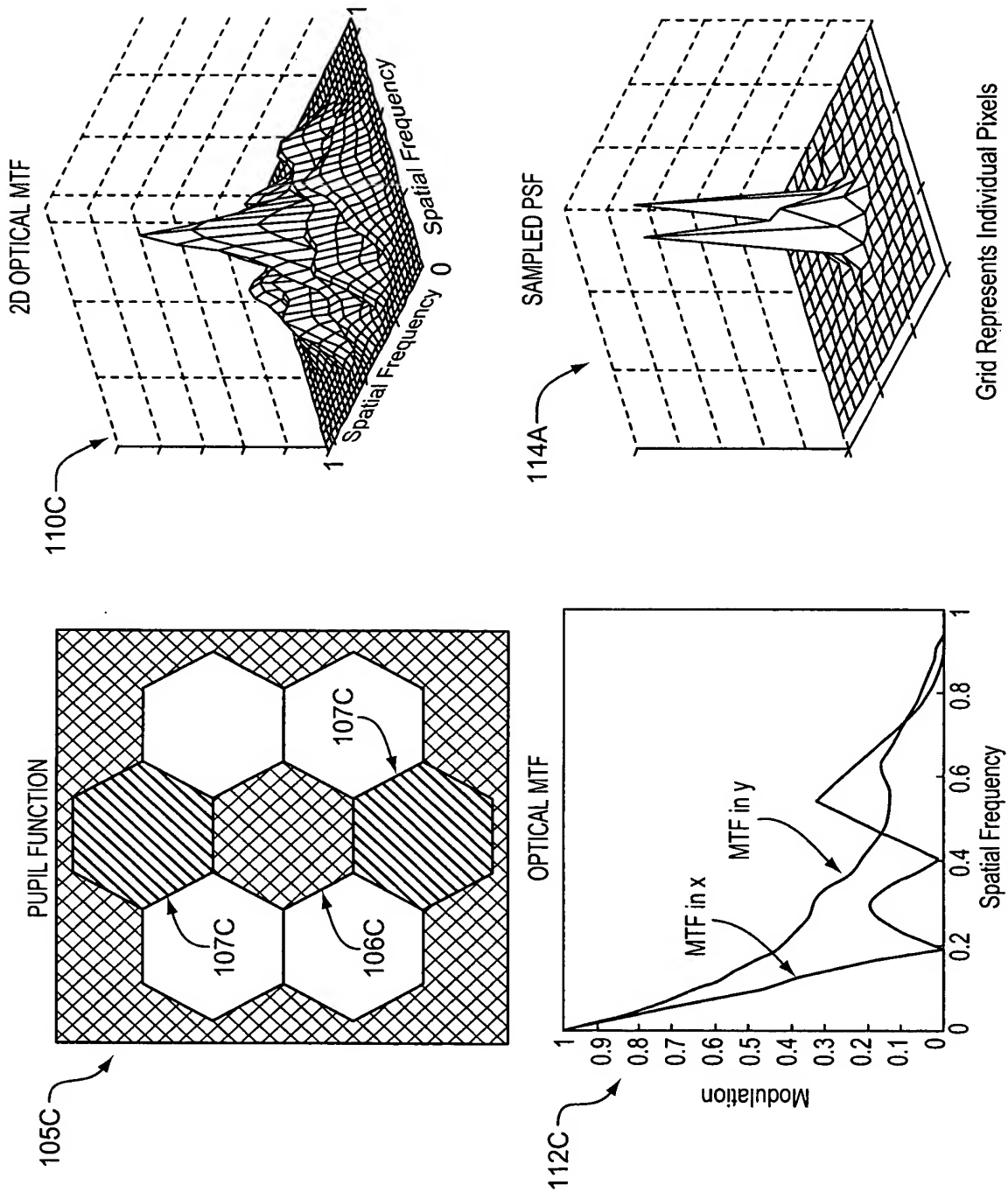


FIG. 3



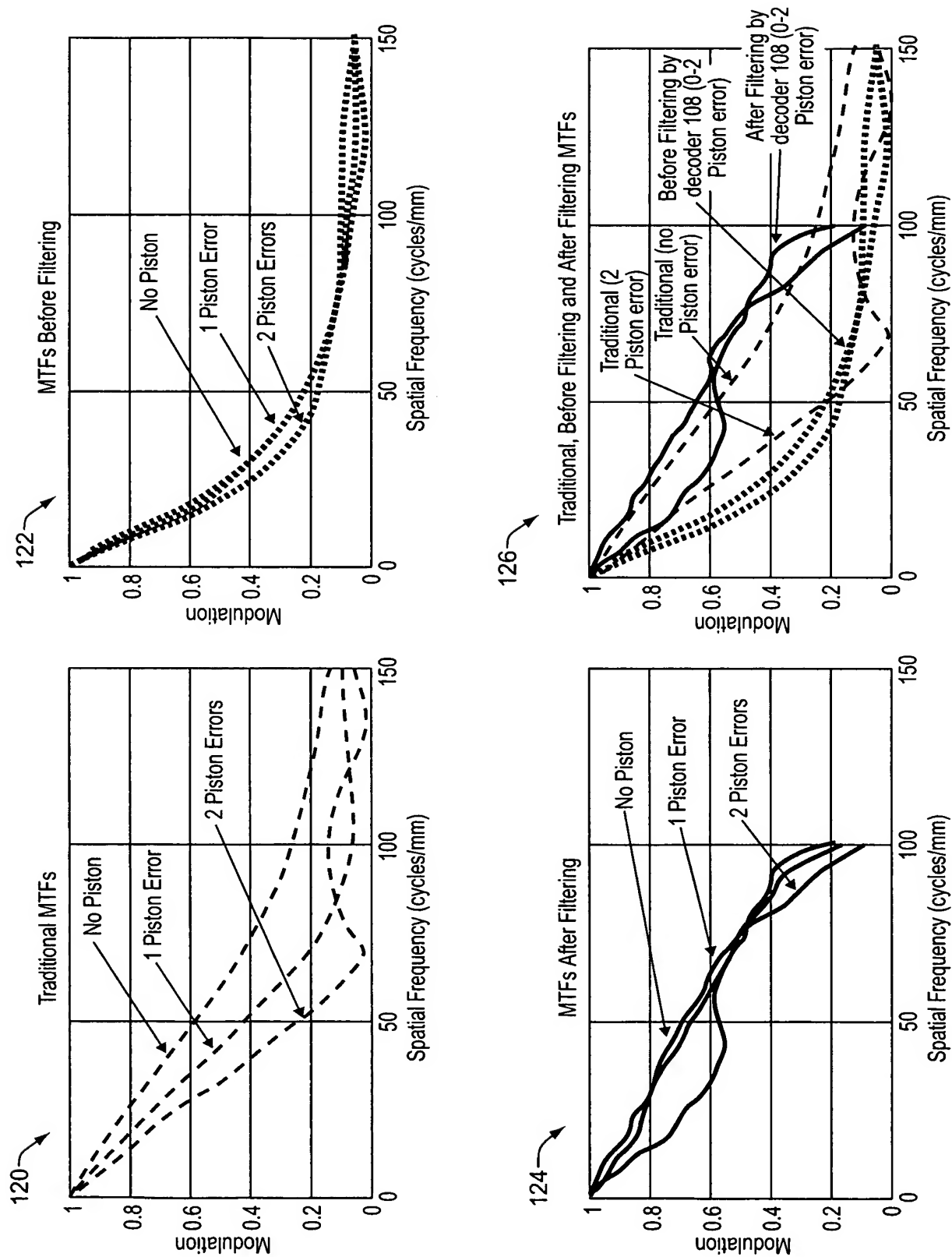
Grid Represents Individual Pixels

FIG. 4

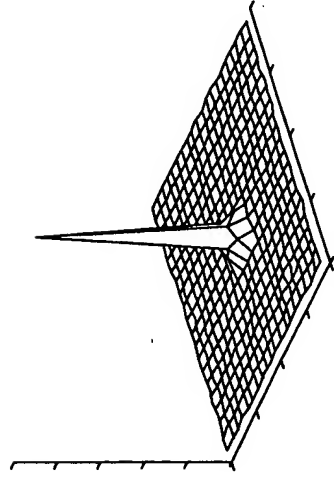


**FIG. 5**

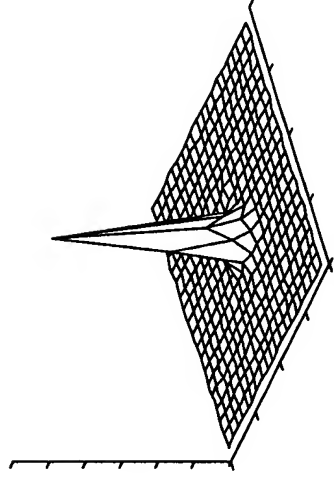
FIG. 6



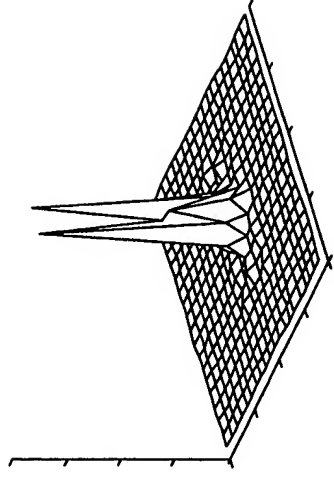
TRADITIONAL IMAGING



NO PISTON ERROR



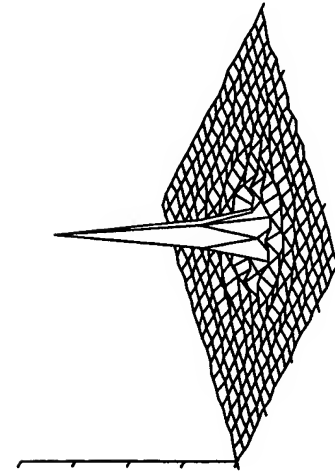
1 PISTON ERROR



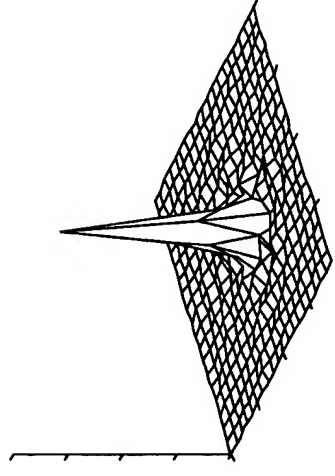
2 PISTON ERRORS

**FIG. 7A**

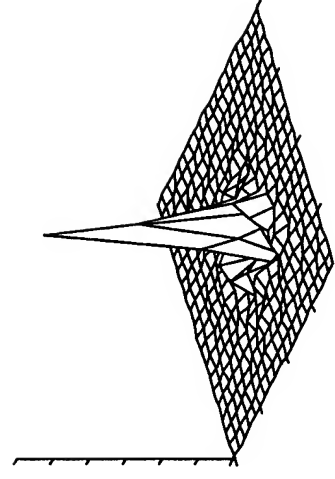
AFTER FILTERING



NO PISTON ERROR



1 PISTON ERROR



2 PISTON ERRORS

**FIG. 7B**

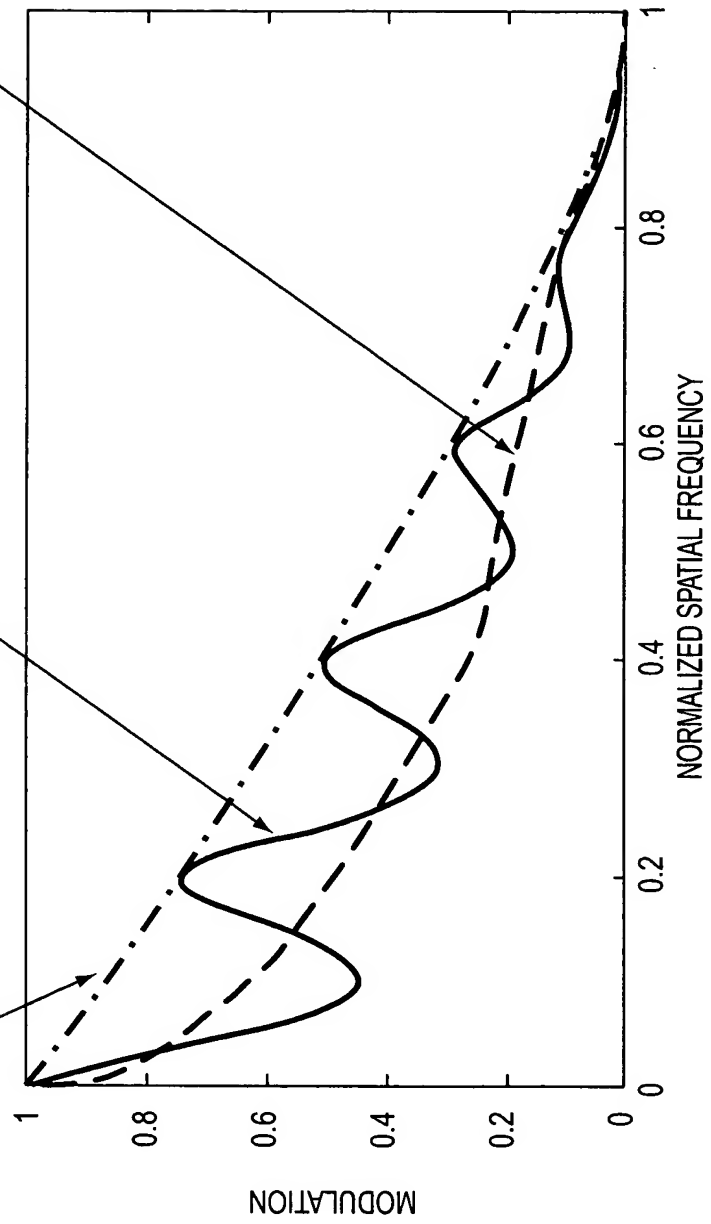
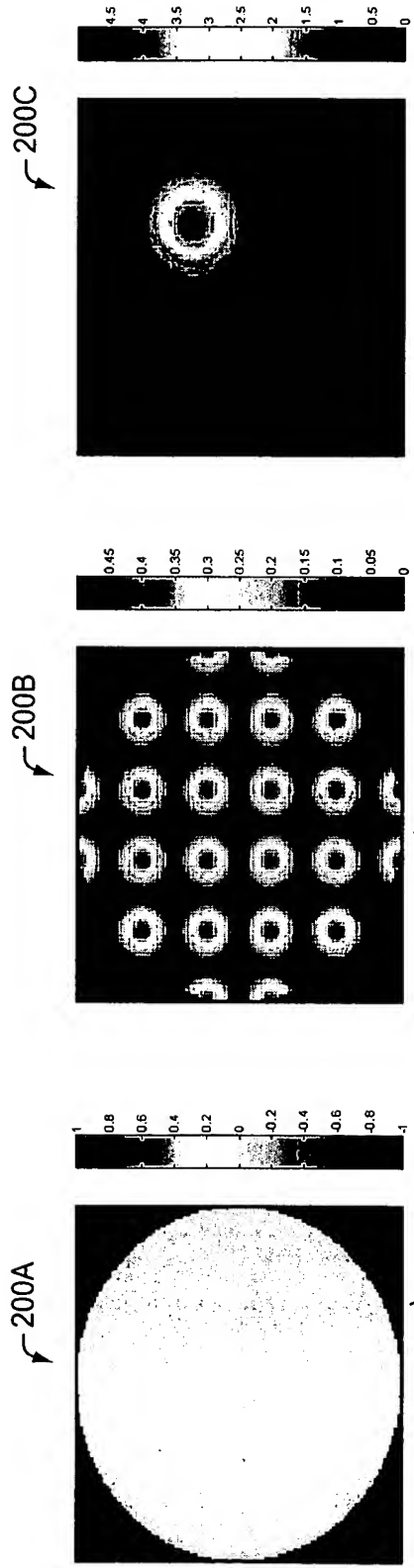


FIG. 8



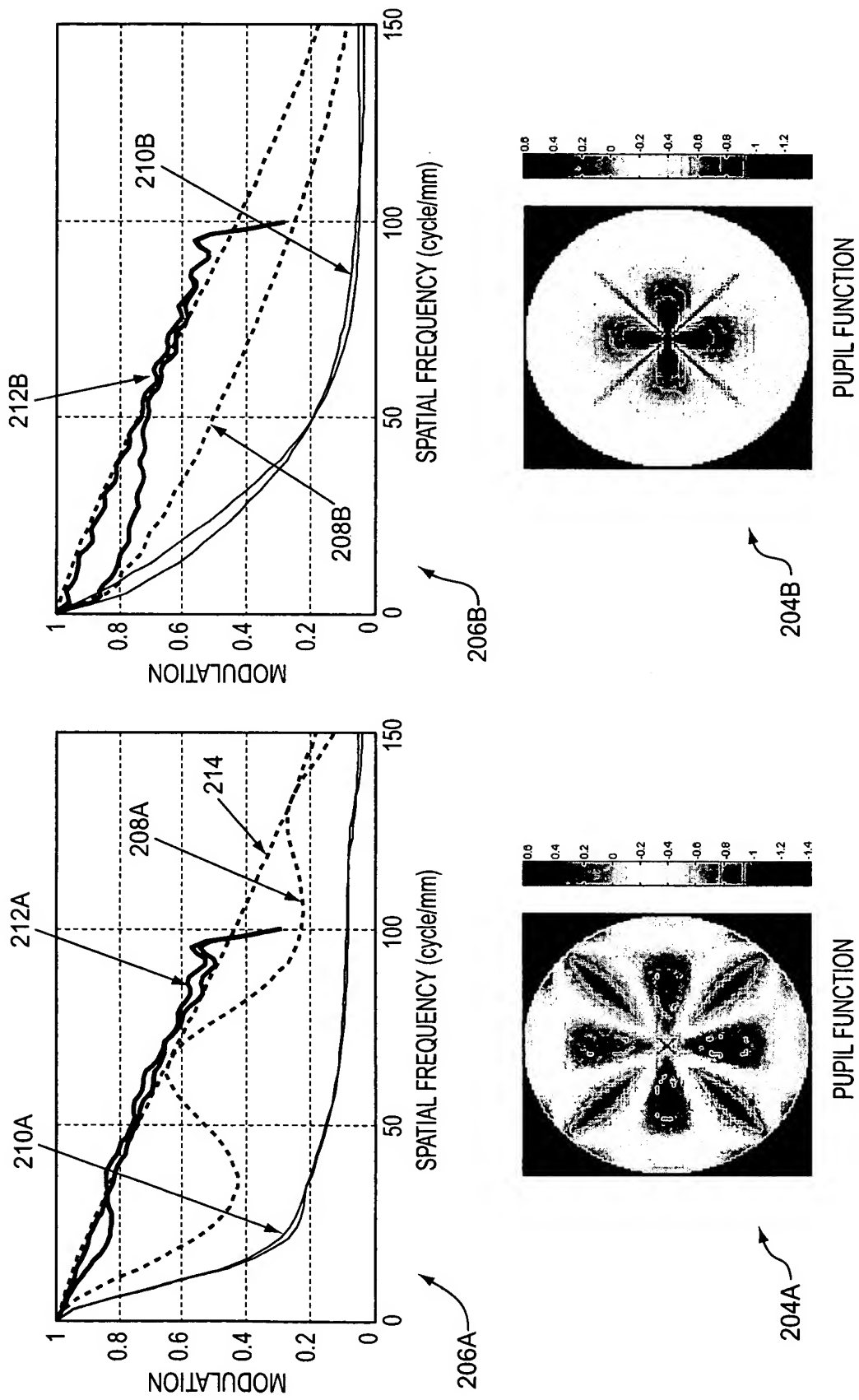
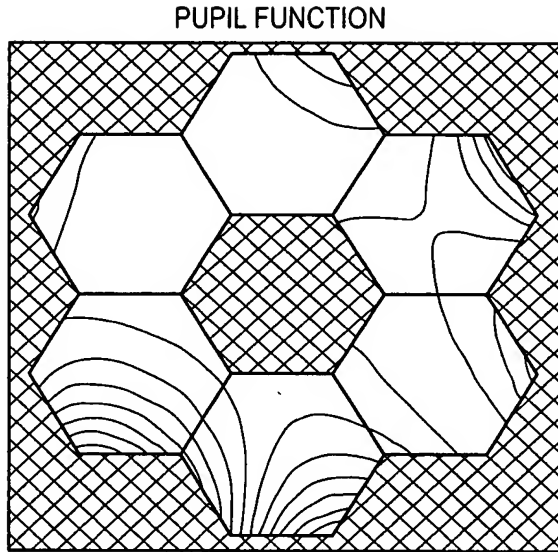


FIG. 9

**FIG. 10**



**FIRST ORDER OPTICAL PARAMETERS**

2-meter collecting aperture  
12-meter focal length  
5- $\mu\text{m}$  pixel size  
100% fill factor  
0.5  $\mu\text{m}$  wavelength

Phase function is a Zernike polynomial with the following weights

#	Mathematical Form	Weight	#	Mathematical Form	Weight
0	1	0	11	$(4\rho^2 - 3)\rho^2 \cos 2\theta$	0.0379
1	$\rho \cos\theta$	0	12	$(4\rho^2 - 3)\rho^2 \sin 2\theta$	-0.1151
2	$\rho \sin\theta$	0	13	$\rho^4 \cos 4\theta$	0.5730
3	$2\rho^2 - 1$	-0.1914	14	$\rho^4 \sin 4\theta$	0.2412
4	$\rho^2 \cos 2\theta$	-0.3986	15	$(4\rho^4 - 12\rho^2 + 3)\rho \cos\theta$	-0.3050
5	$\rho^2 \sin 2\theta$	0.0290	16	$(4\rho^4 - 12\rho^2 + 3)\rho \sin\theta$	-0.1698
6	$(3\rho^2 - 2)\rho \cos\theta$	0.1073	17	$(5\rho^5 - 4\rho^3)\cos 3\theta$	0.0589
7	$(3\rho^2 - 2)\rho \sin\theta$	-0.0336	18	$(5\rho^5 - 4\rho^3)\sin 3\theta$	-0.0965
8	$\rho^3 \cos 3\theta$	0.0496	19	$\rho^5 \cos 5\theta$	0.7186
9	$\rho^3 \sin 3\theta$	-0.0562	20	$\rho^5 \sin 5\theta$	-0.5219
10	$6\rho^4 - 6\rho^2 + 1$	-0.2093			

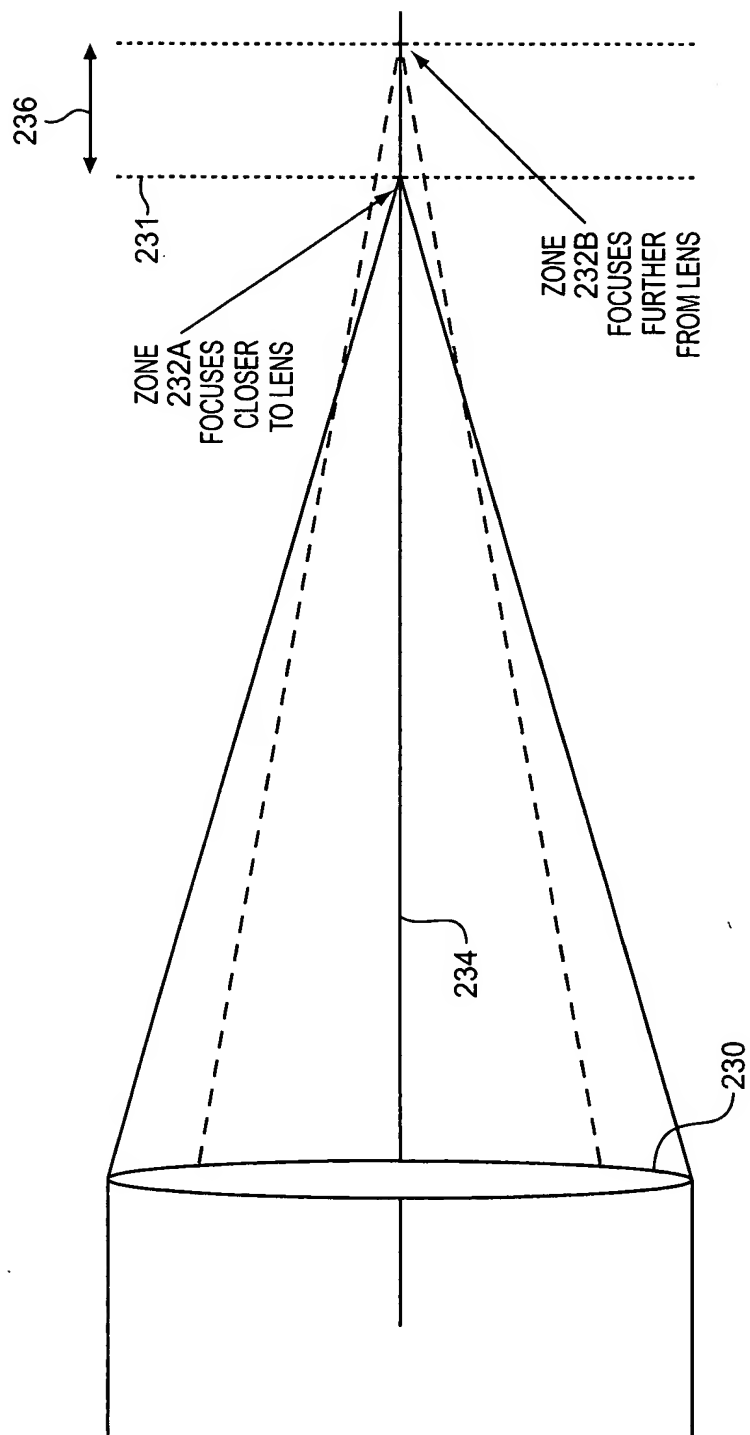


FIG. 11

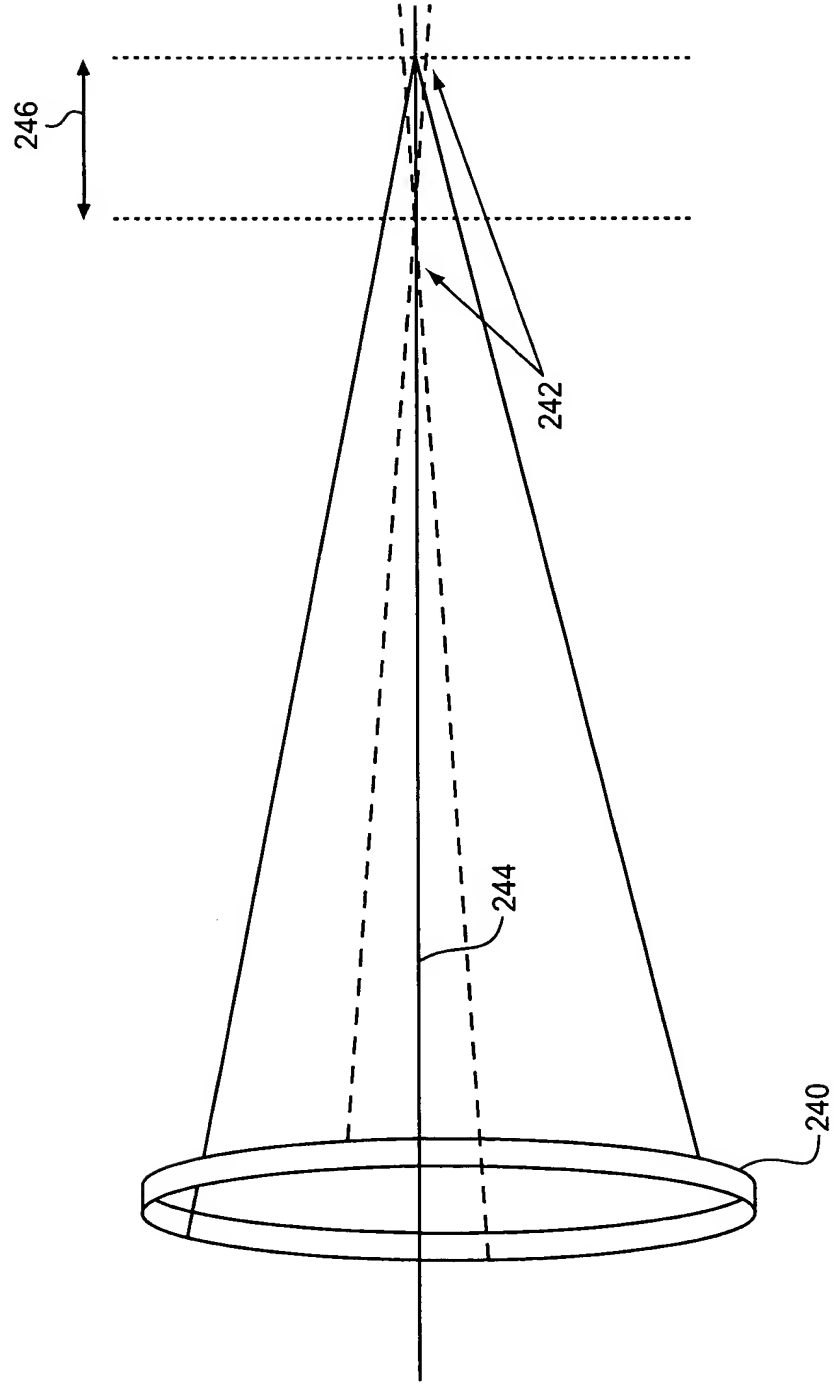
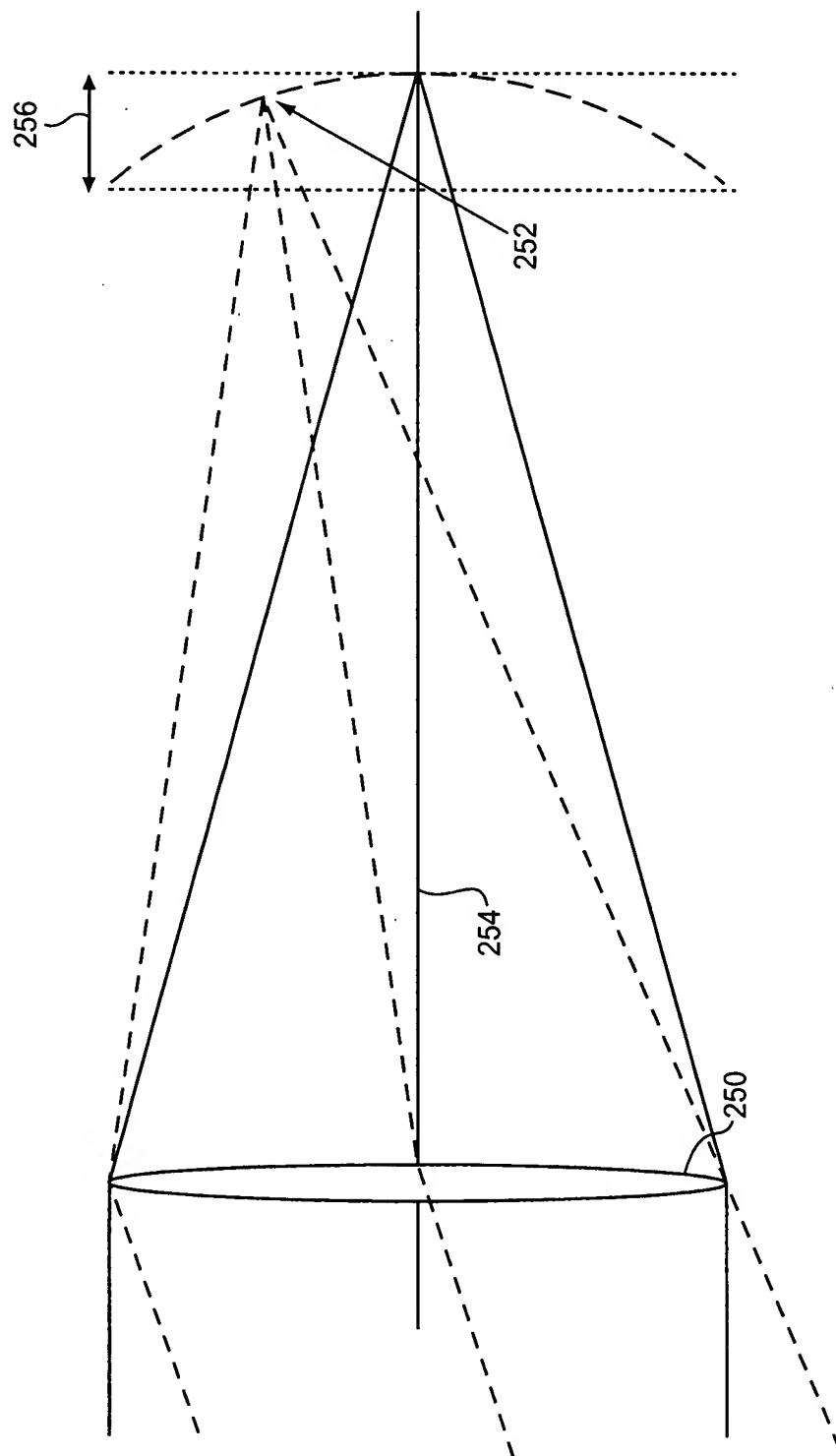


FIG. 12



**FIG. 13**

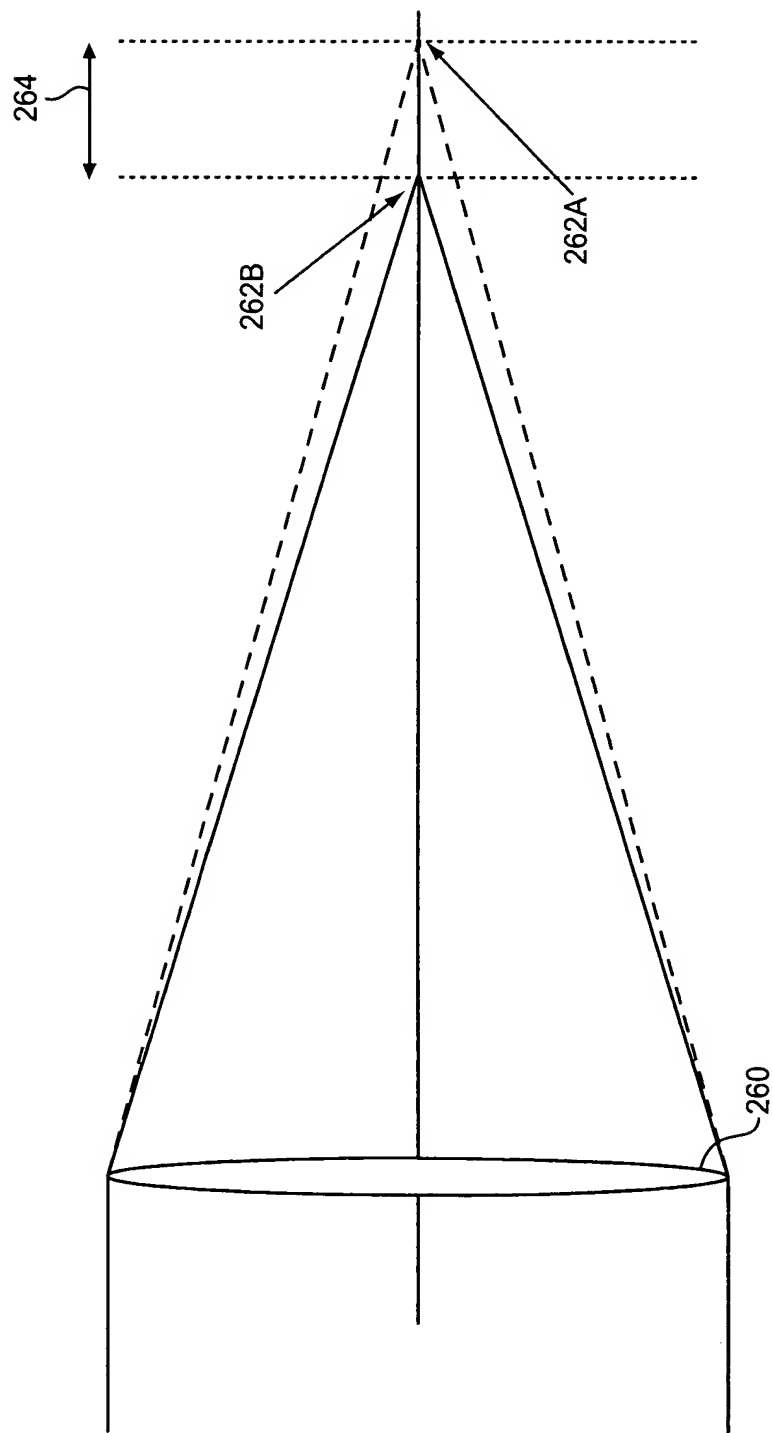


FIG. 14

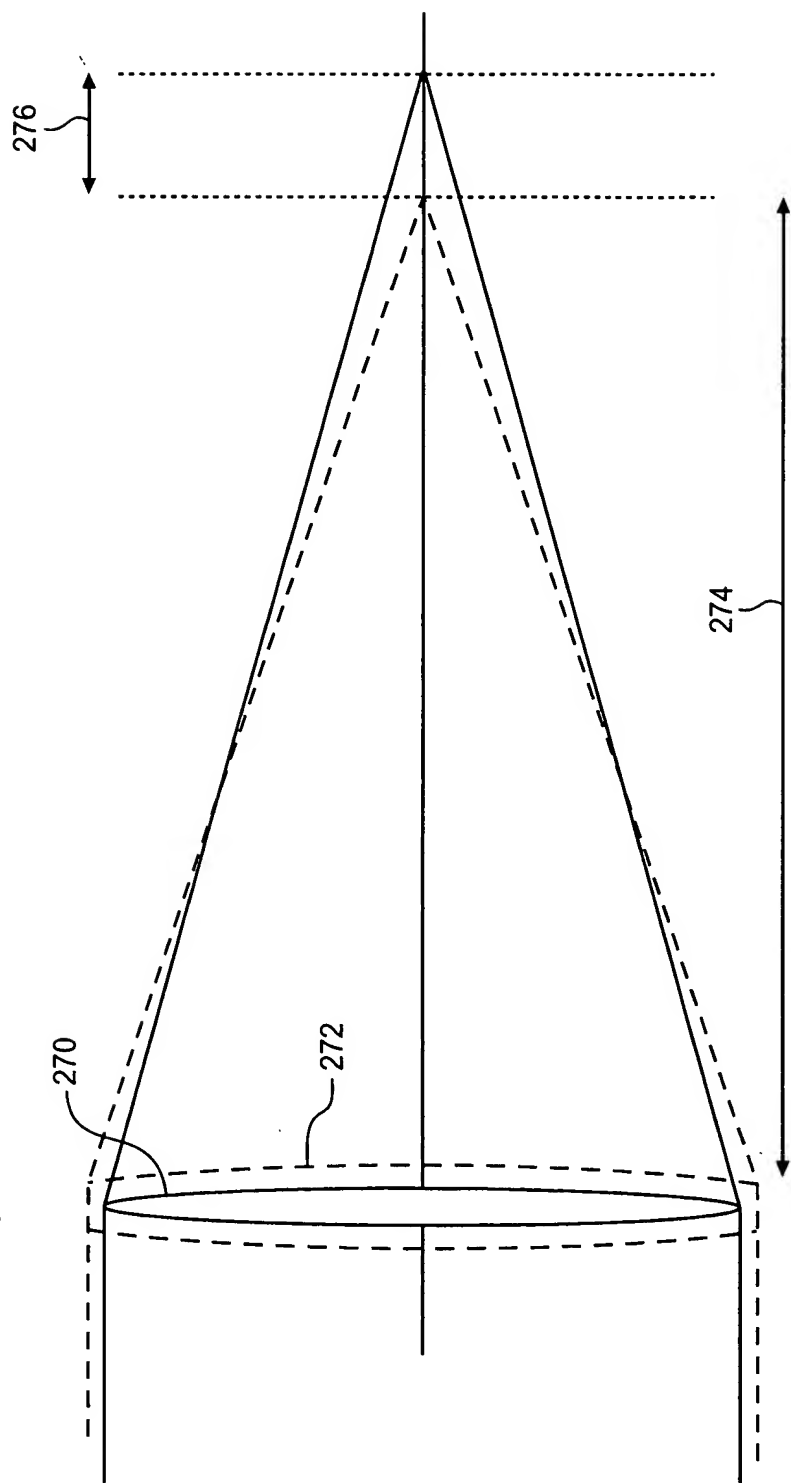


FIG. 15

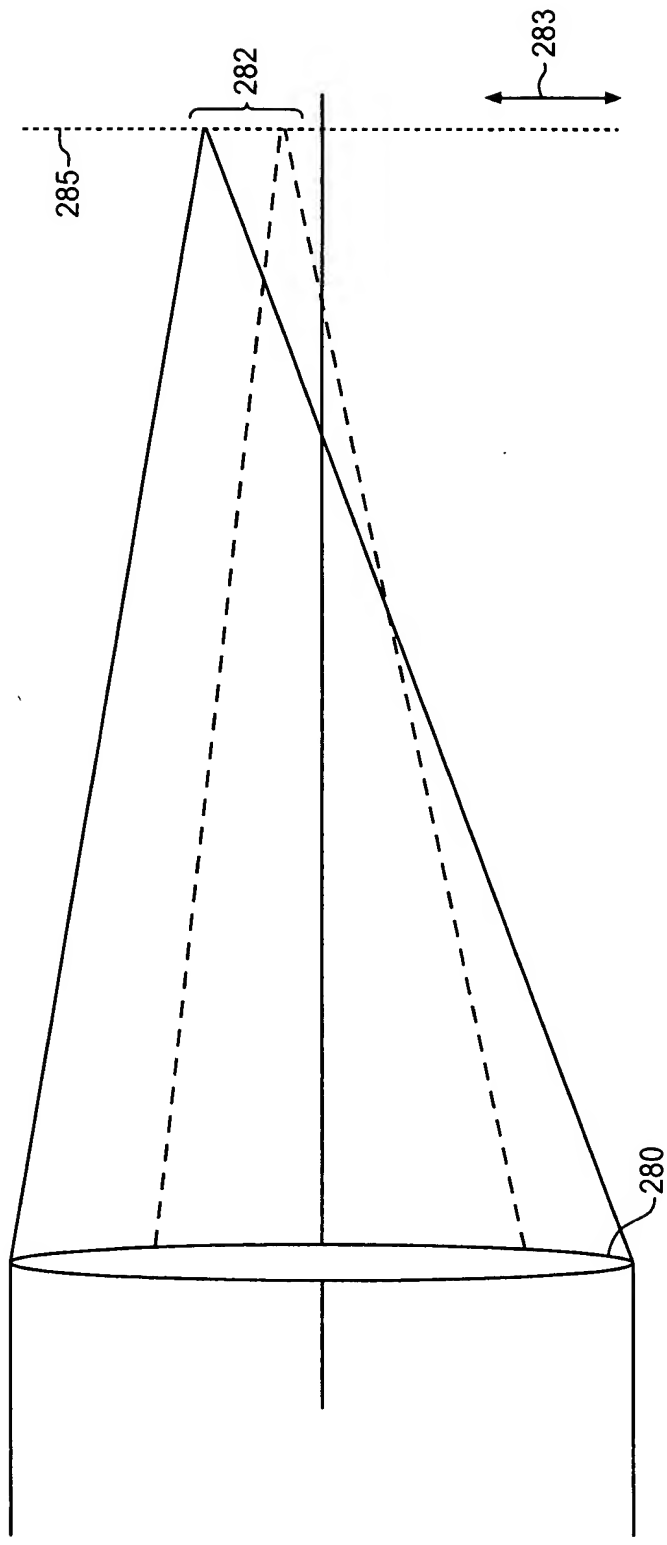
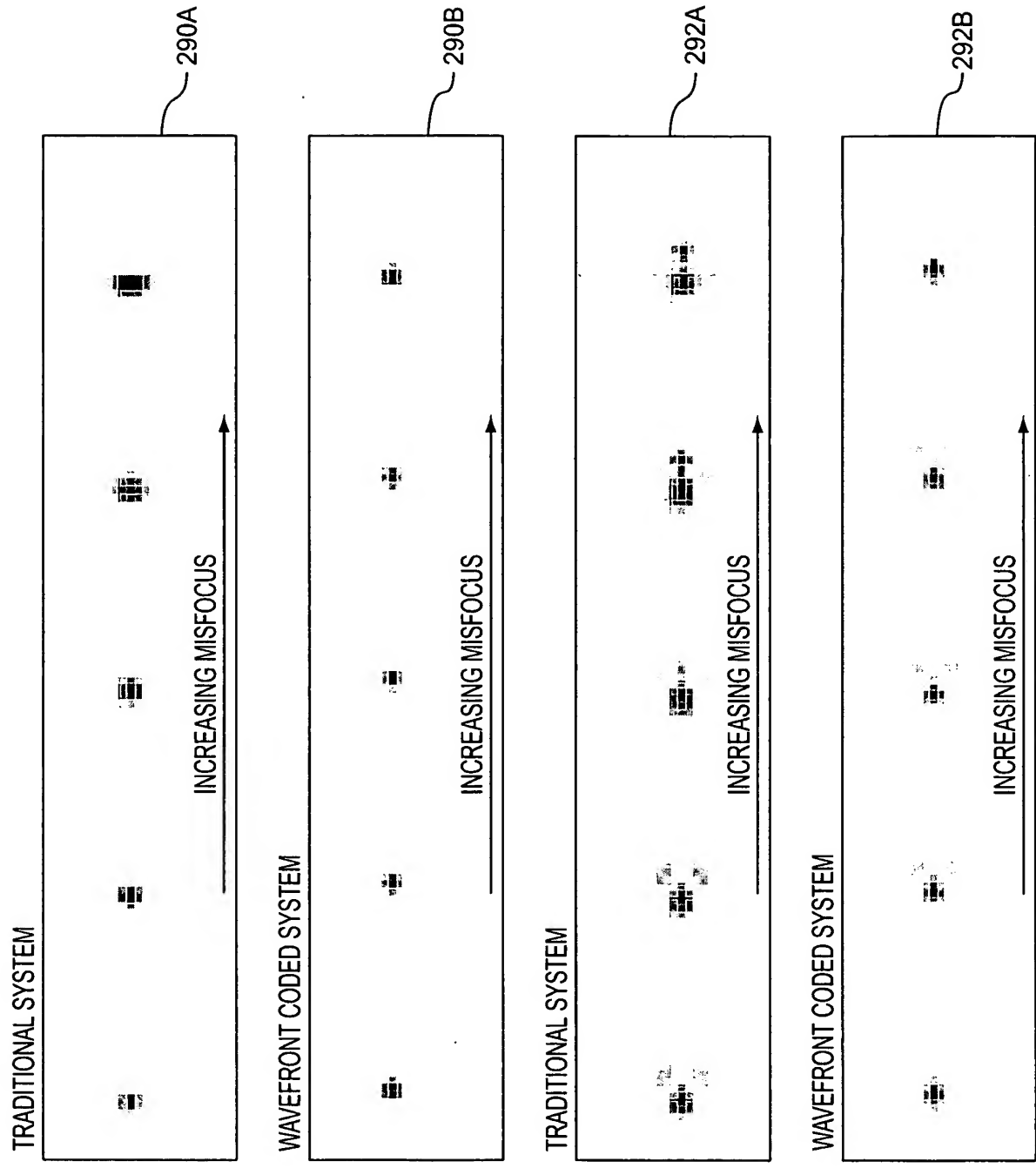


FIG. 16

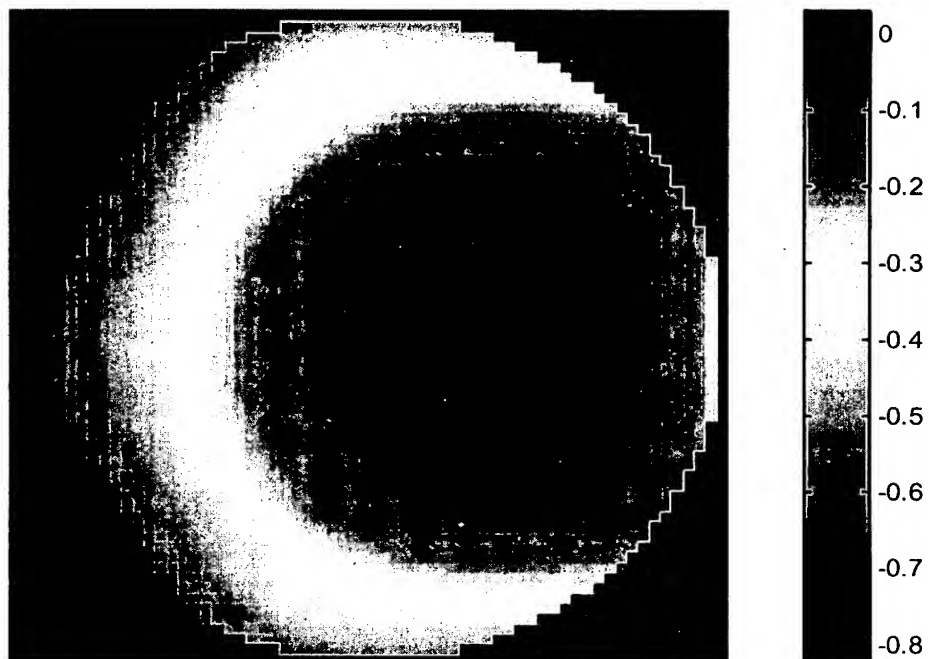


FIG. 17



**FIG. 17A**

EXIT PUPIL OPD IN WAVES

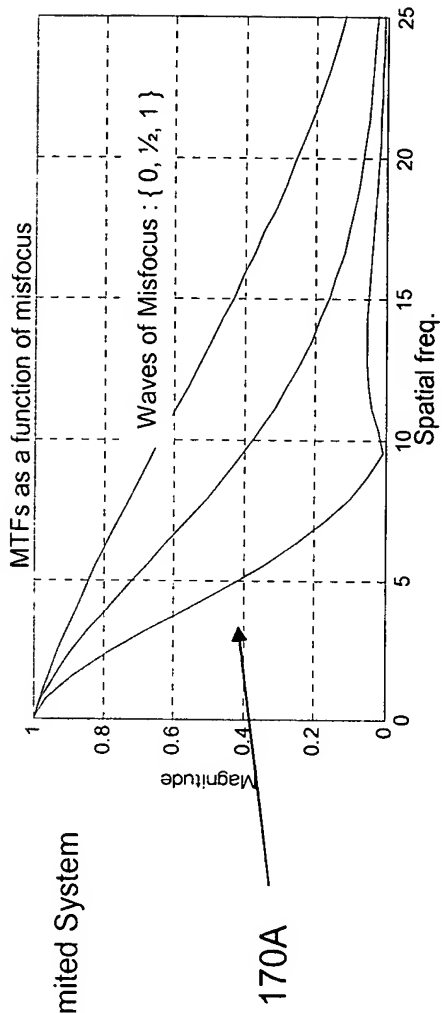


Weights = [-0.1837 -0.3292 0.3110 -0.0210 -0.0628]

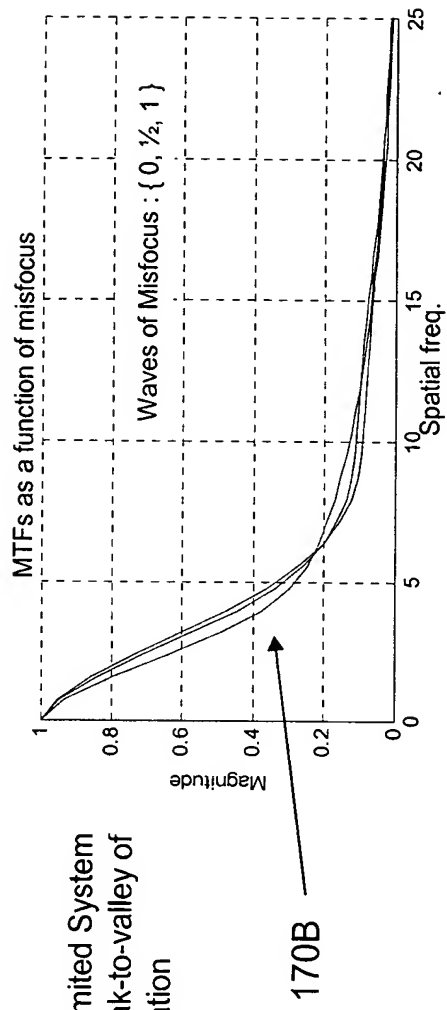
Functional Form = [  $R$   $R^3$   $R^5$   $R\cos(\theta)$   $R^3\cos(3\theta)$  ]

**FIG. 17B**

Diffraction-Limited System



Diffraction-Limited System  
+ 1 wave peak-to-valley of  
Trefoil aberration



Diffraction-Limited System  
+ 3 waves peak-to-valley of  
Coma aberration

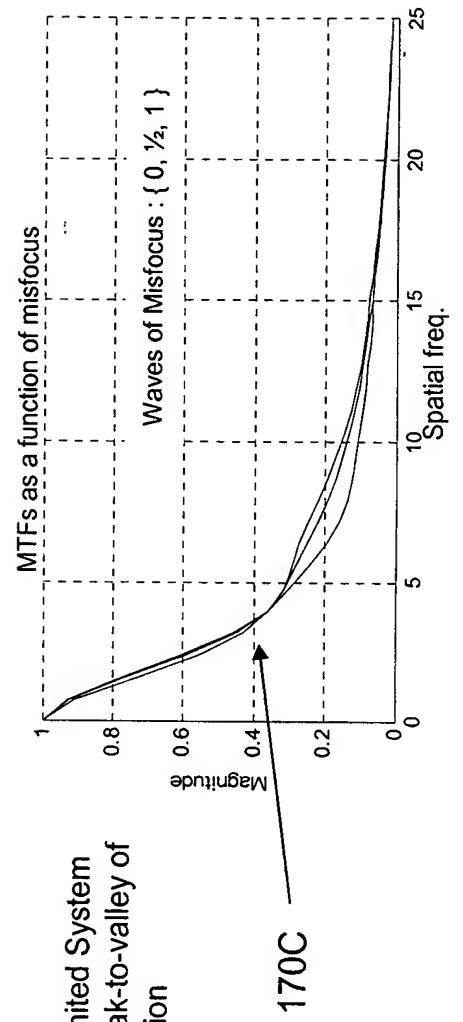
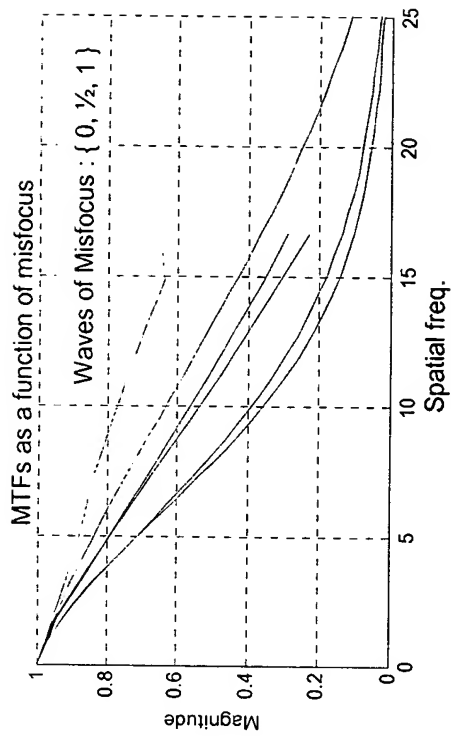
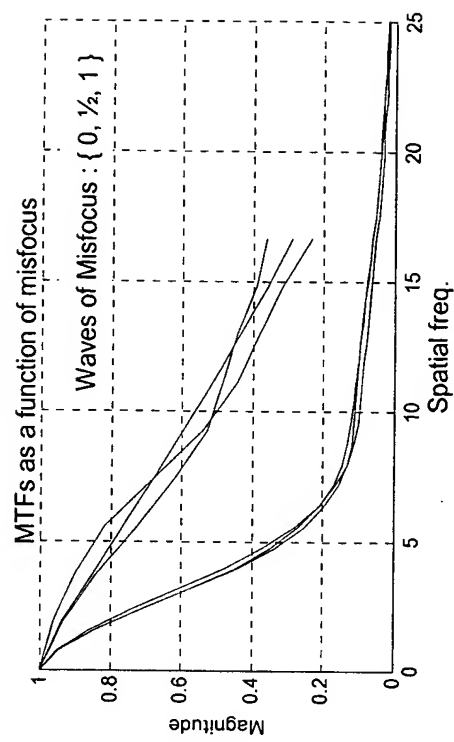


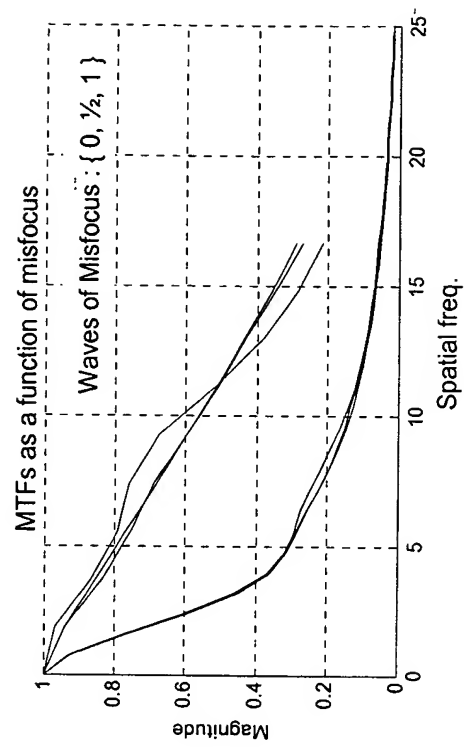
FIG. 17C



171A

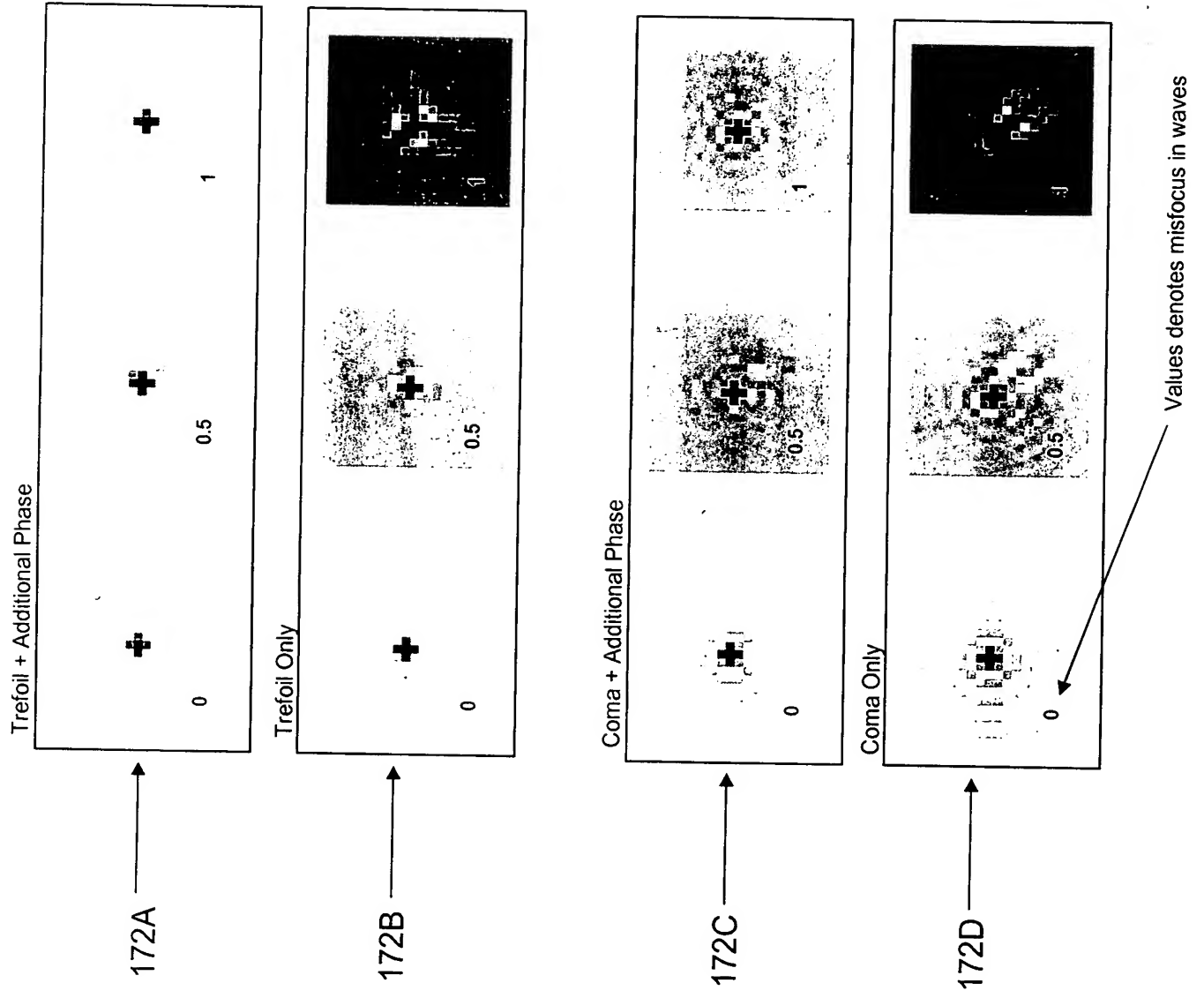


171B



171C

**FIG. 17D**



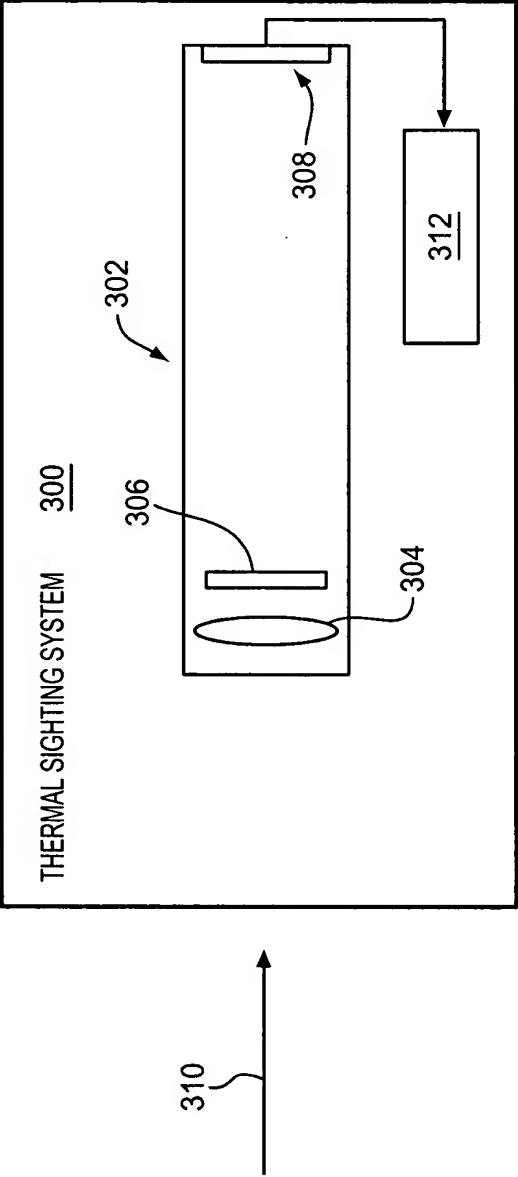
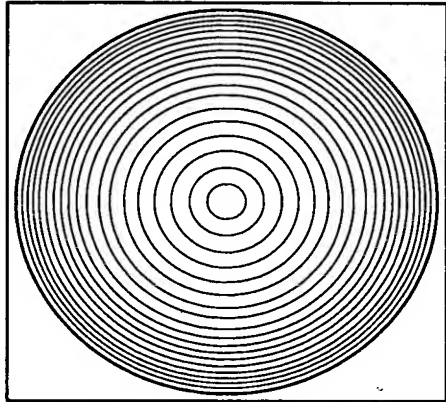
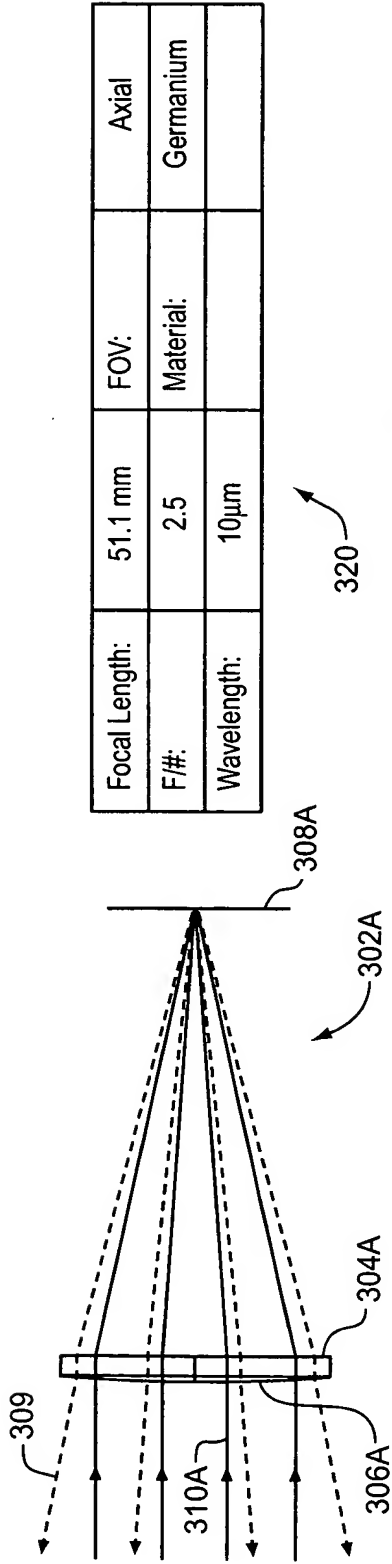
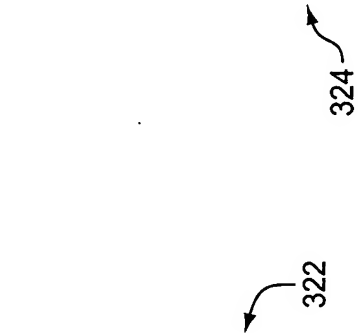


FIG. 18



**Constant Profile Path Surface:**  
 Constant profile path optics, the paths being defined along the sides of a square

Along the paths form given by:  
 $C(x) = 3.9 \times 10^{-3} + 7.7 \times 10^{-5} x^2, |x| < 1$   
 Across the paths form given by:  
 $D(y) = 1.97 \times [0.1 y - 0.18 y^2 + 1.02 y^3], 0 < y < 1$



**Odd Asphere Surface:**

Aspheric Terms:

Conic	-8.42
1 <sup>st</sup>	$9.35 \times 10^{-4}$
3 <sup>rd</sup>	$2.61 \times 10^{-4}$
5 <sup>th</sup>	$4.07 \times 10^{-4}$
7 <sup>th</sup>	$9.00 \times 10^{-5}$

**FIG. 19**

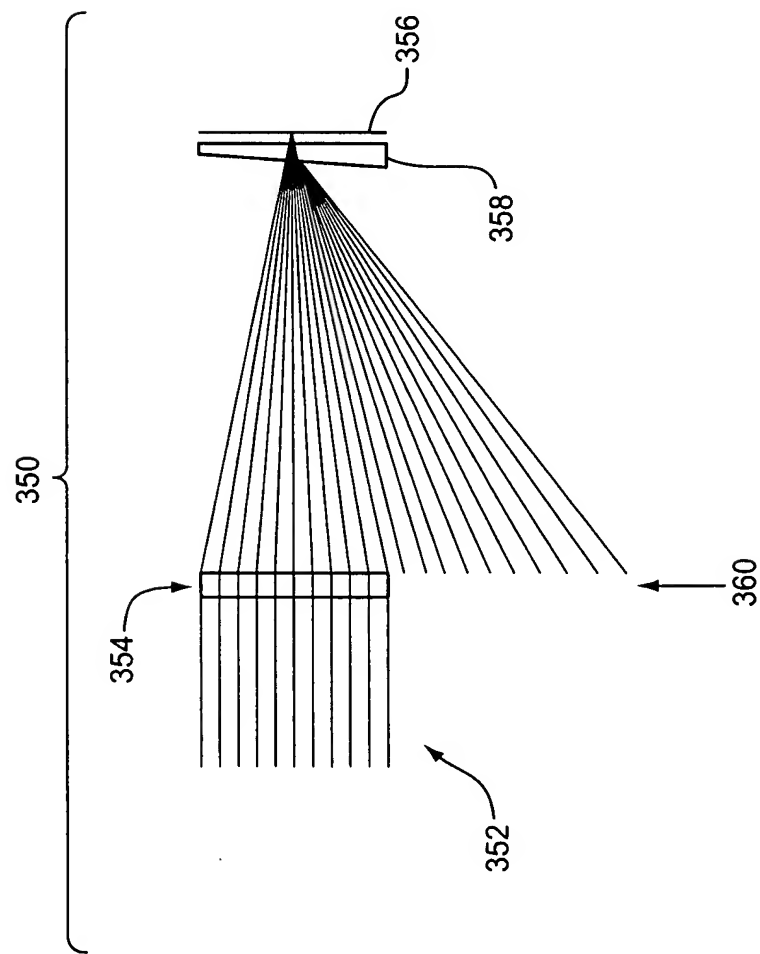


FIG. 20A

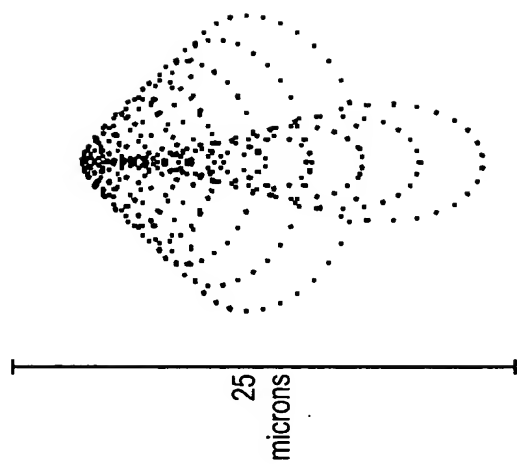


FIG. 20B



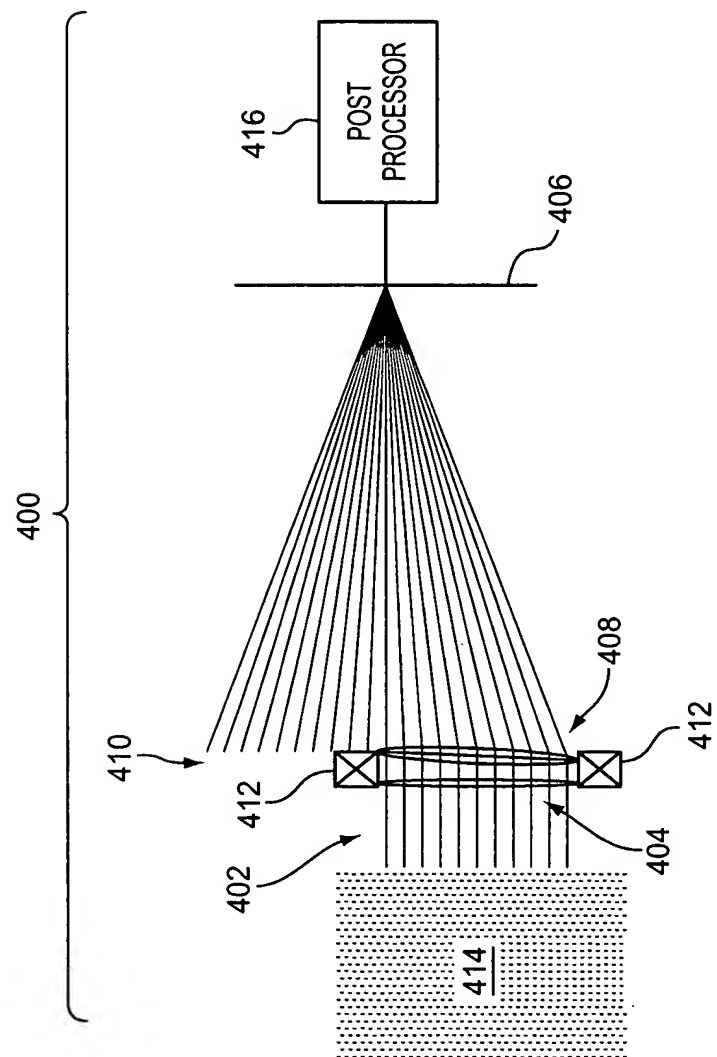


FIG. 21A

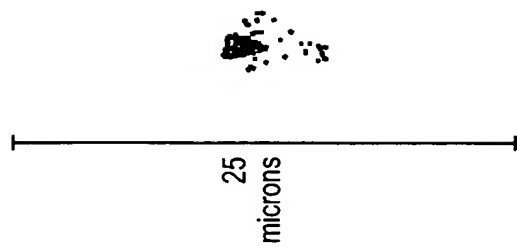
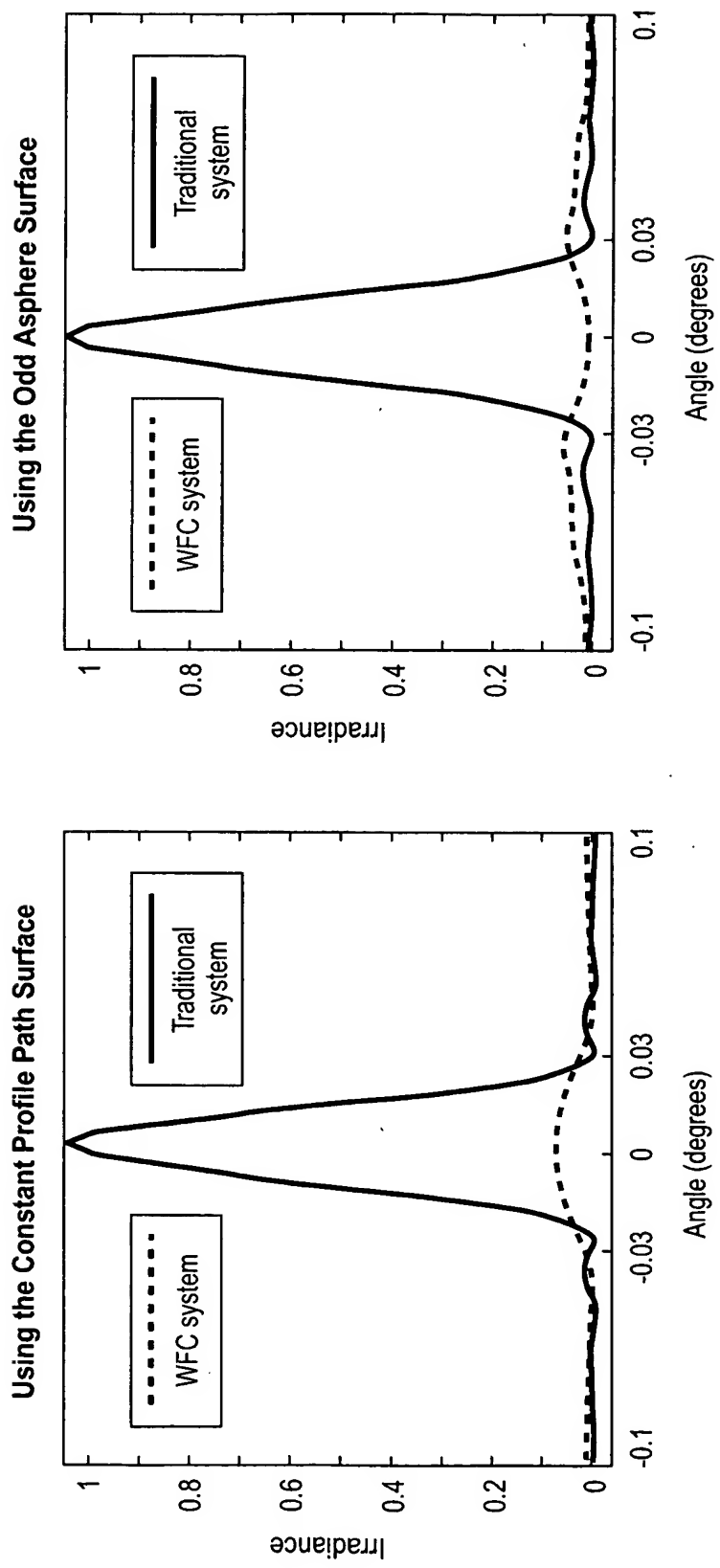


FIG. 21B



410

412

FIG. 22

FIG. 22A

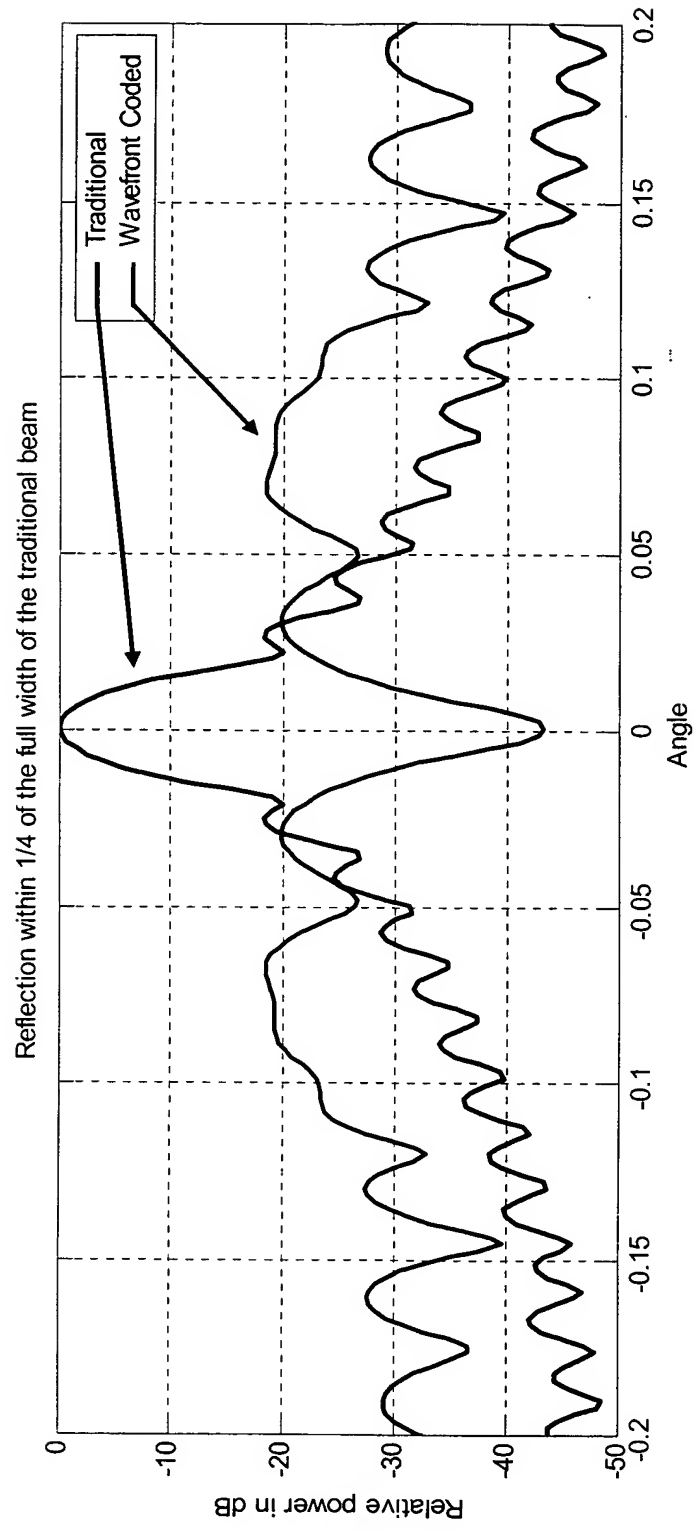


FIG. 22B

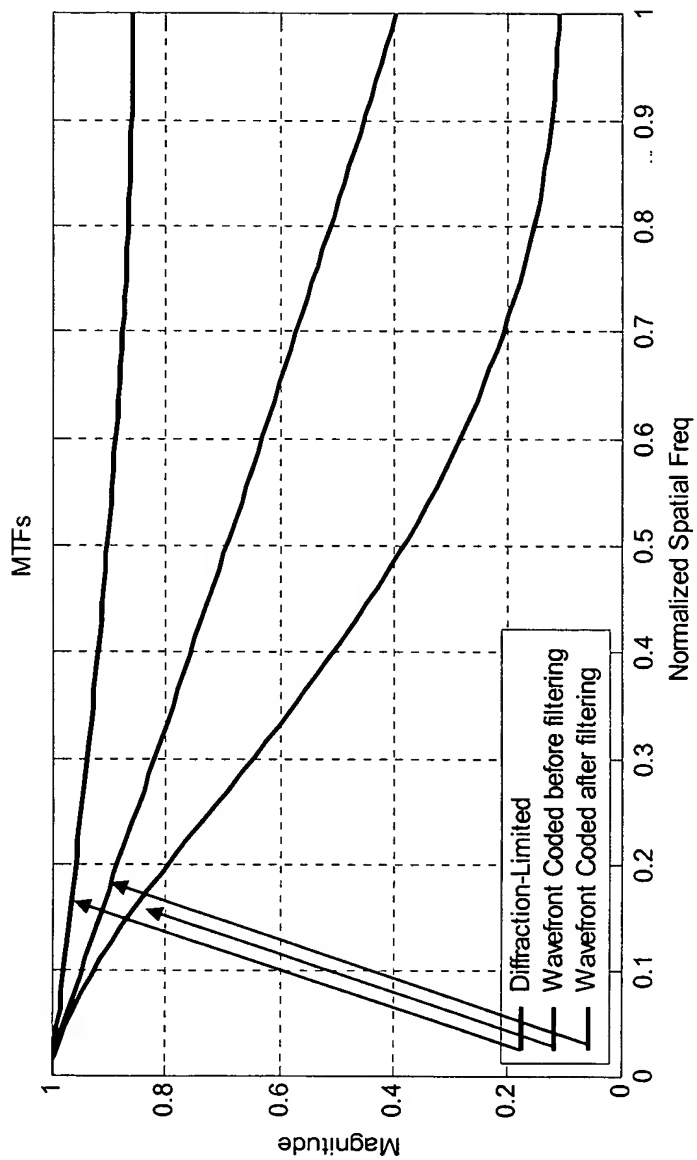


FIG. 22C

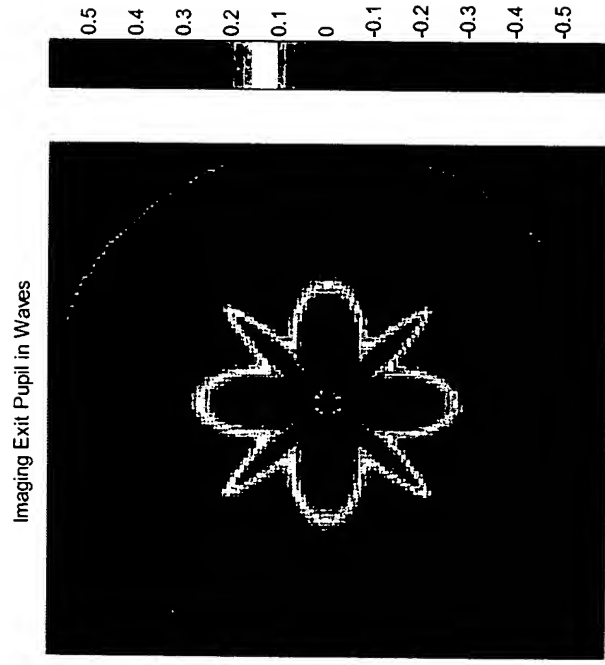
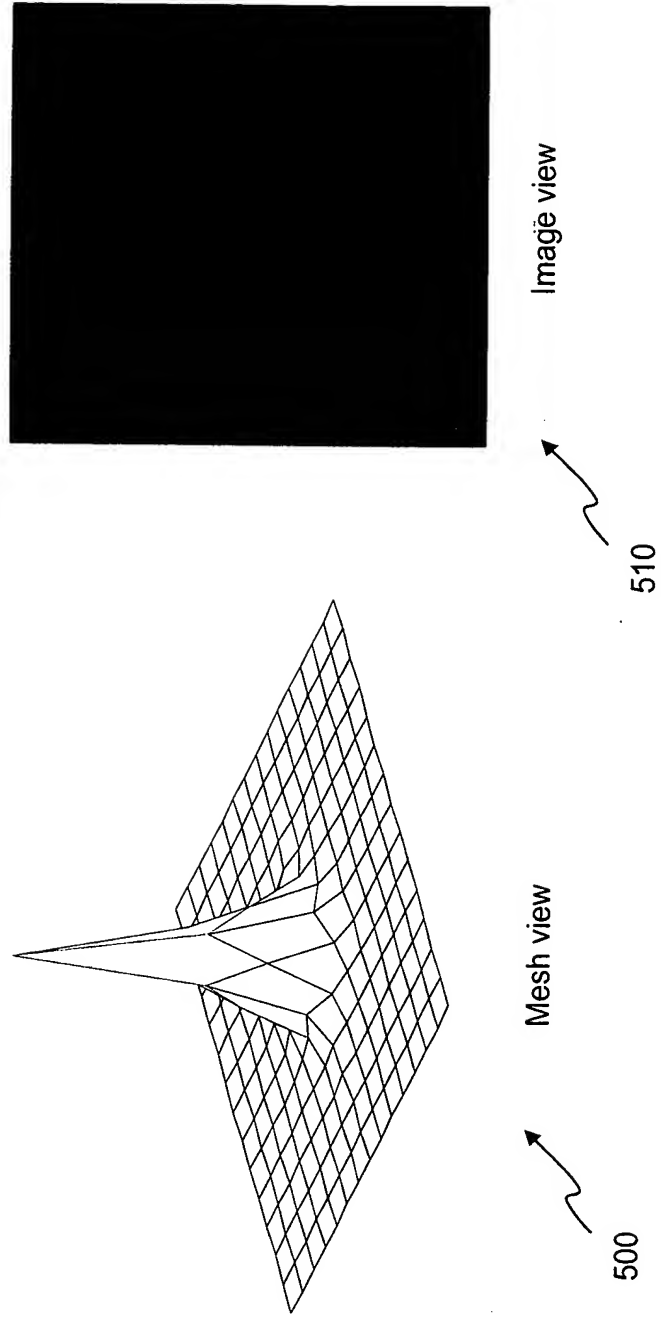


FIG. 22D



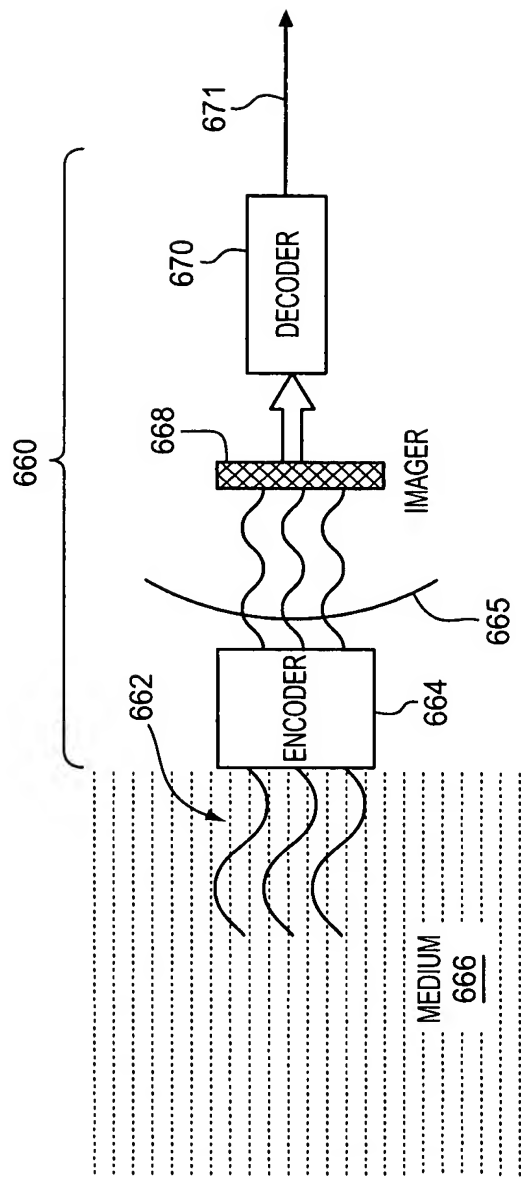
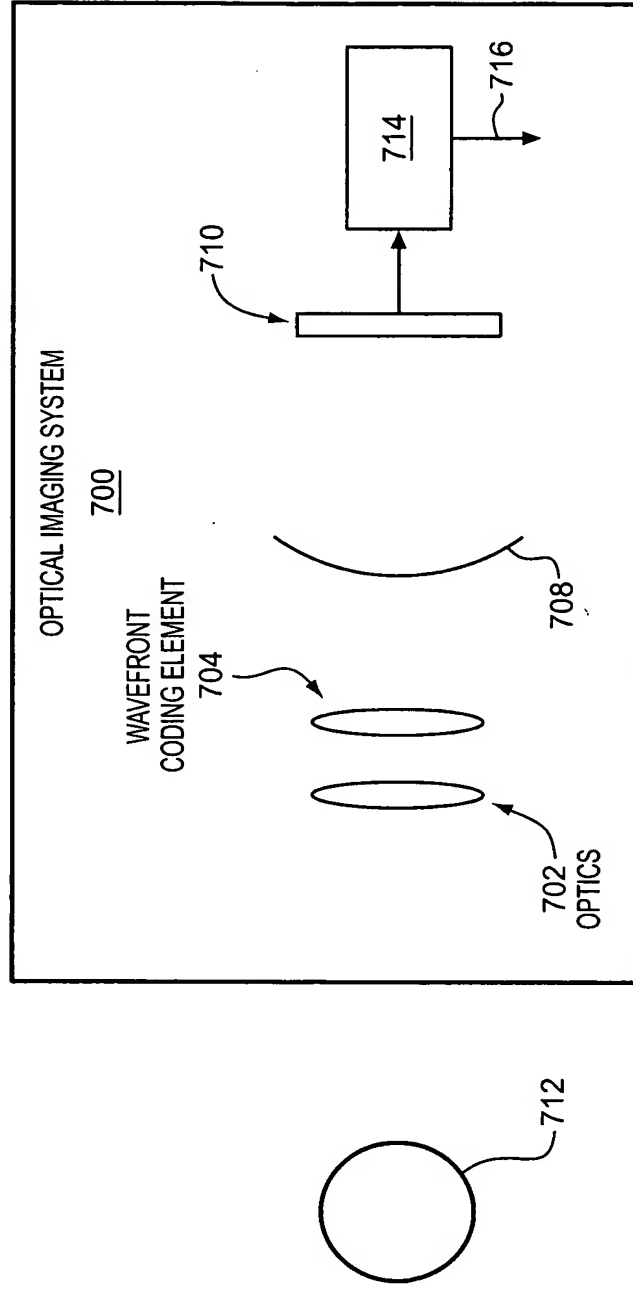


FIG. 23



**FIG. 24**



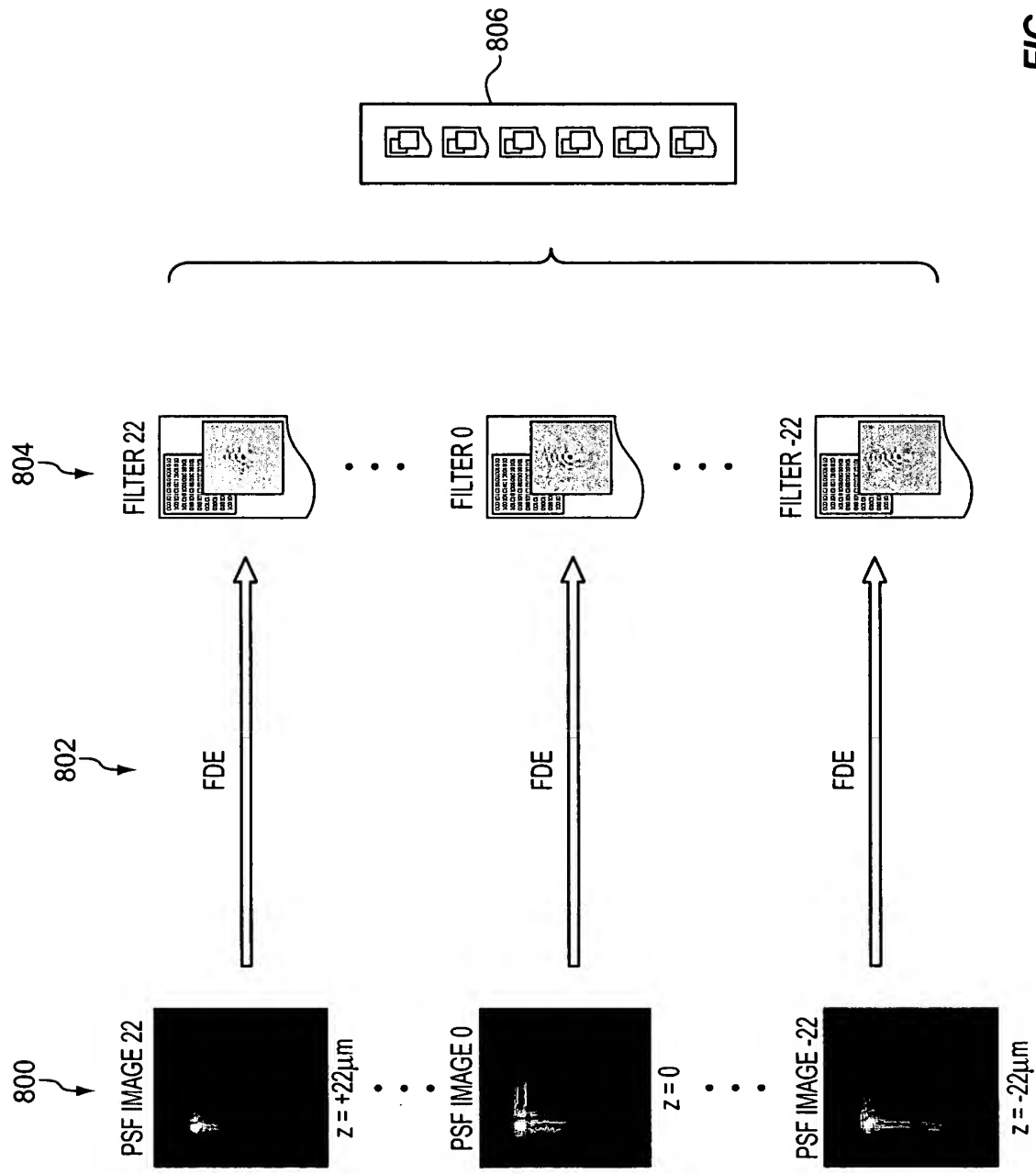


FIG. 25

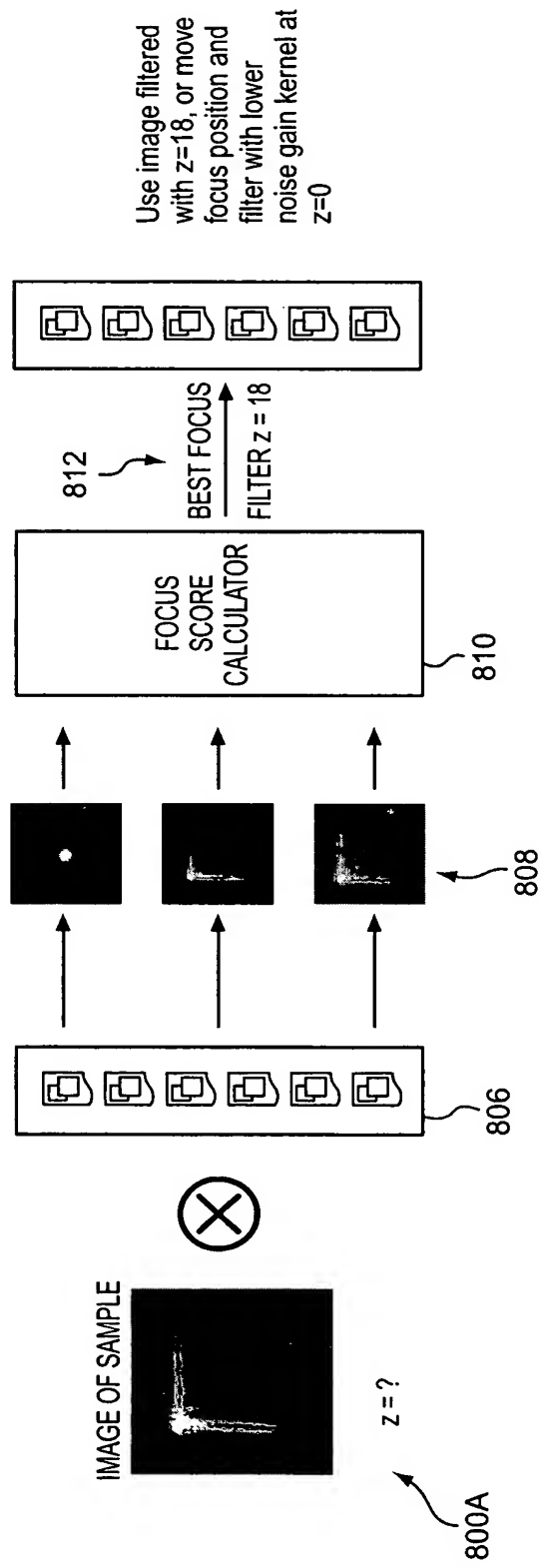


FIG. 26

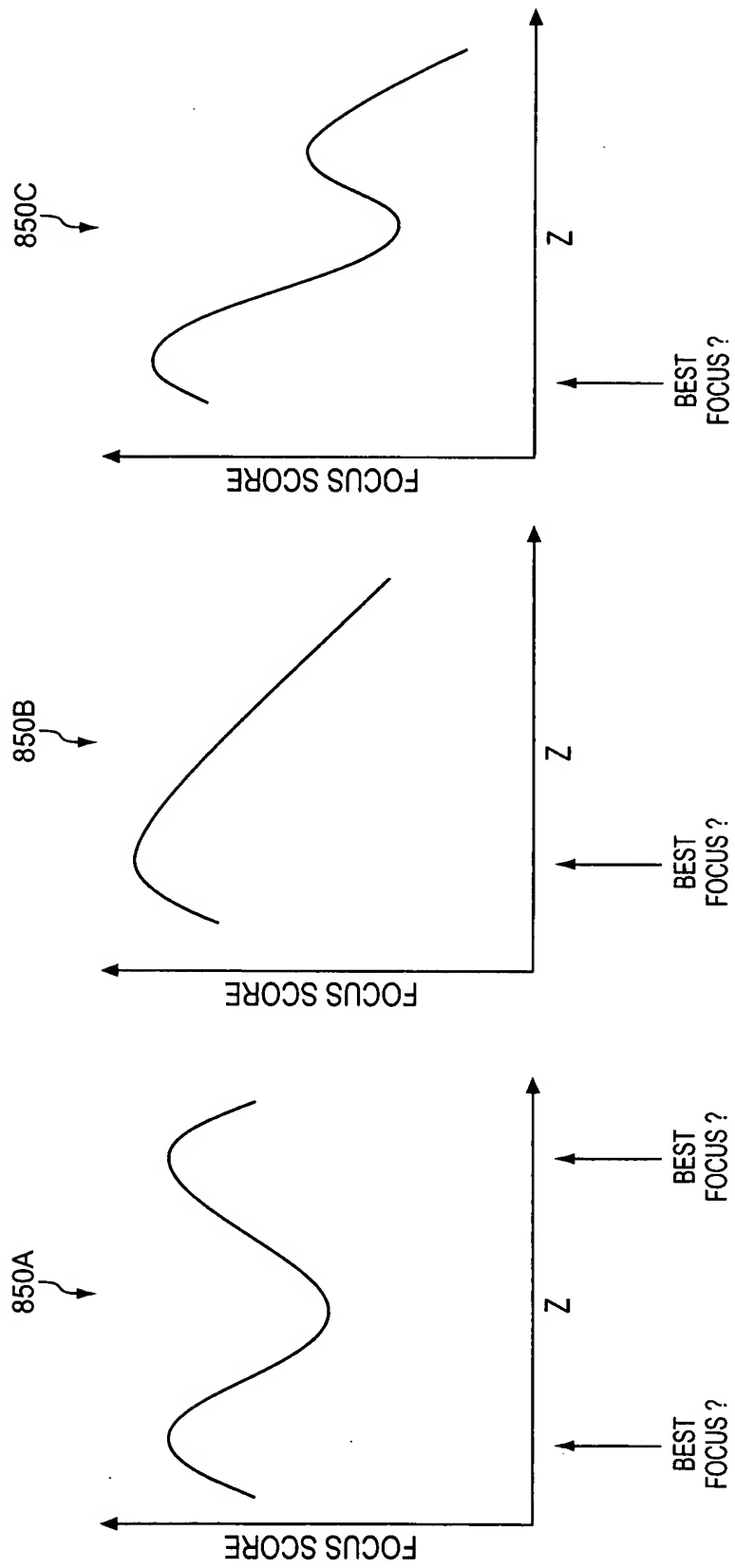


FIG. 27

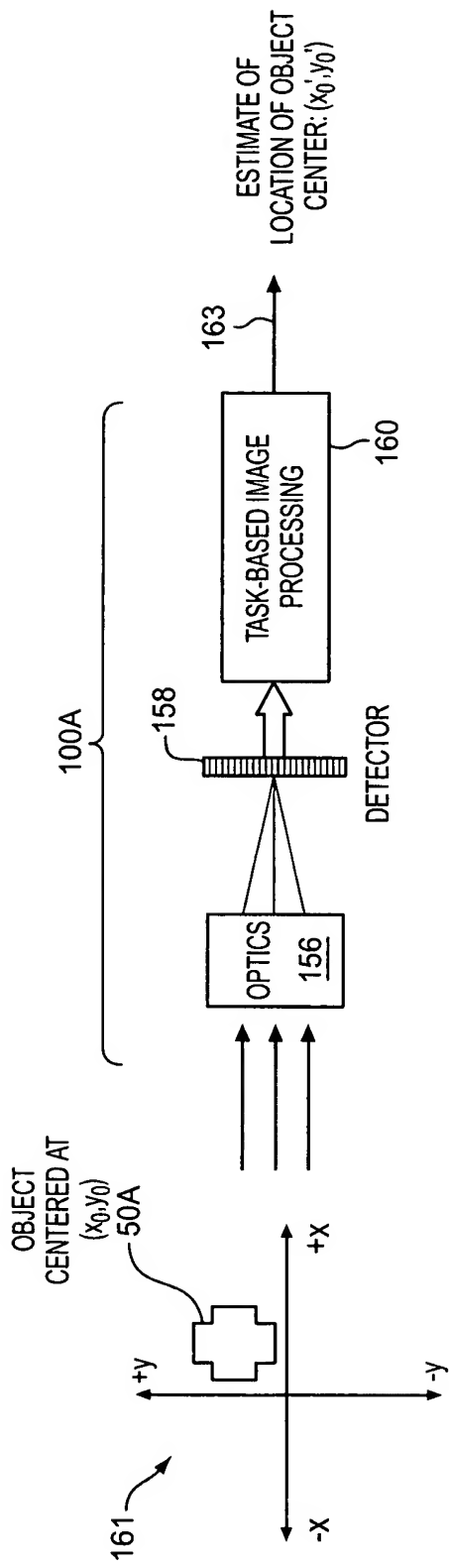


FIG. 28A

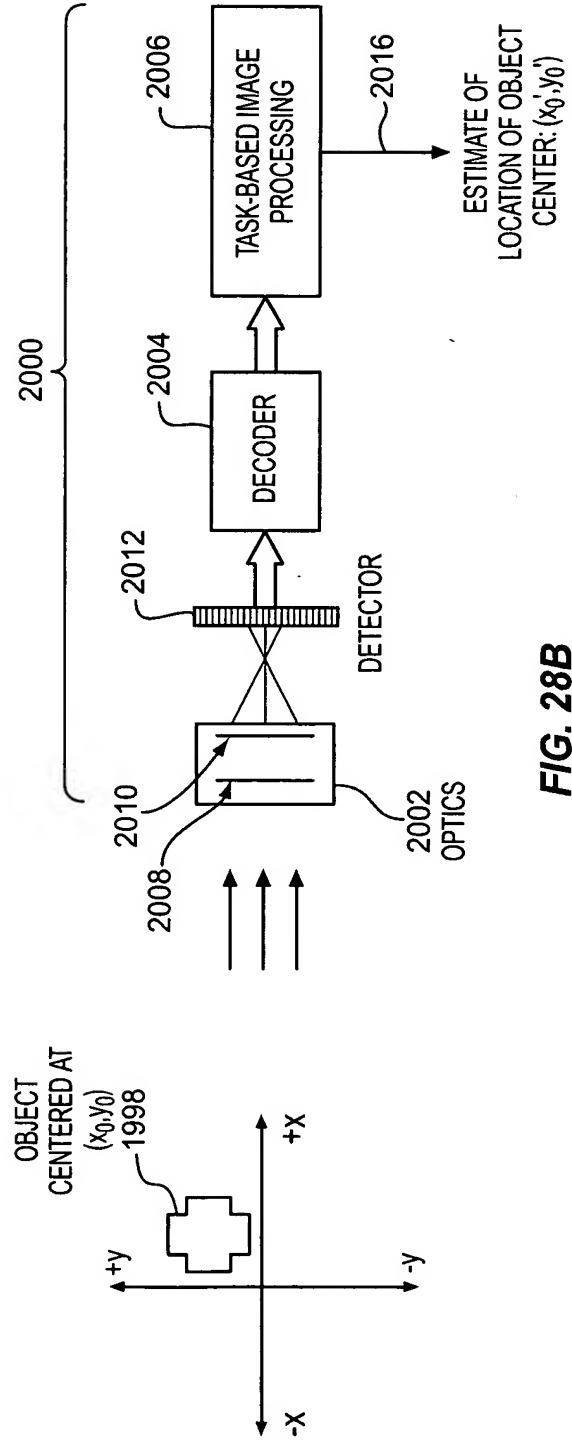


FIG. 28B

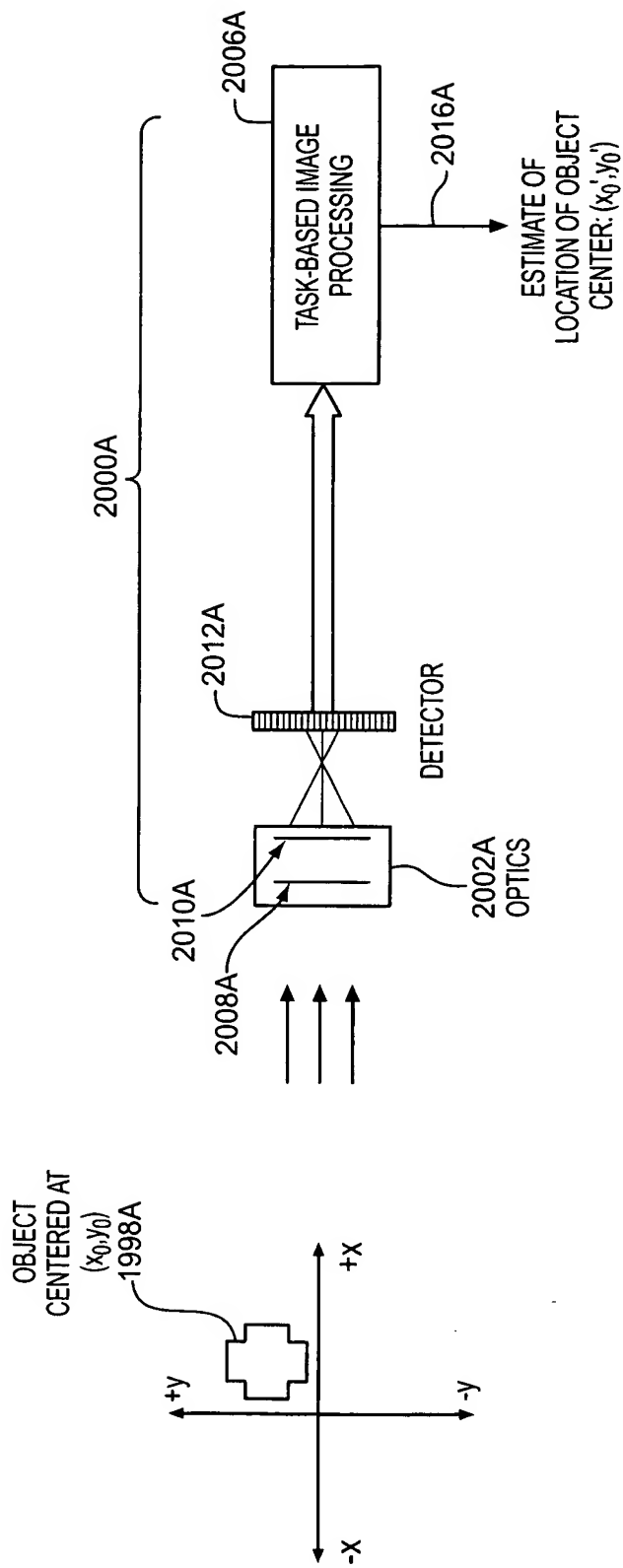
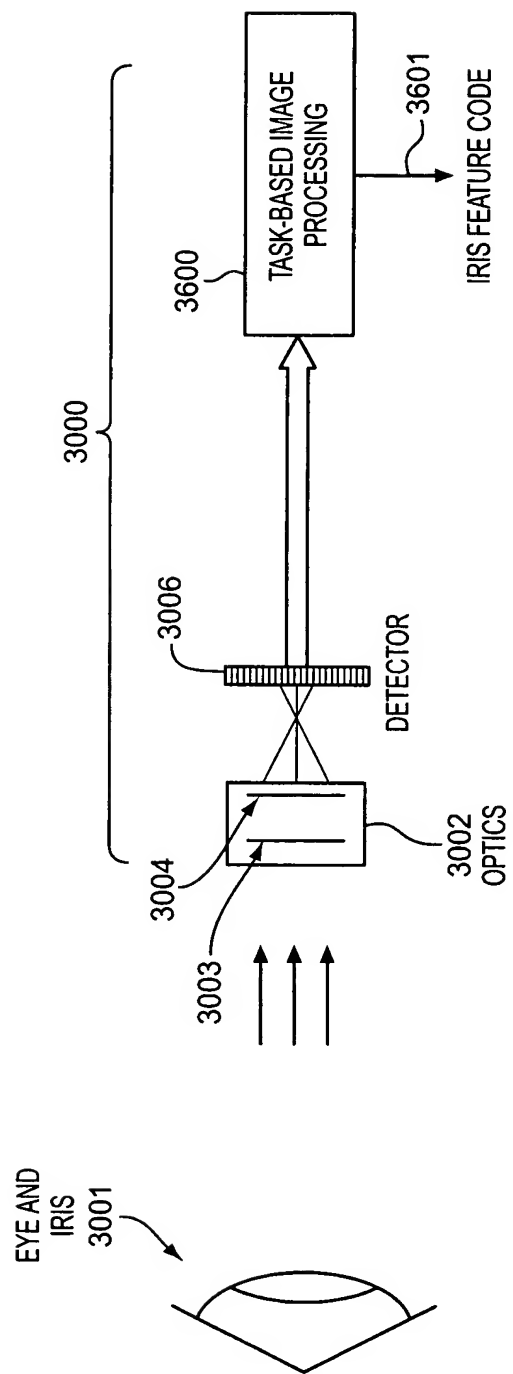


FIG. 28C



**FIG. 29**